

COMMERCIAL FISHERIES *Review*

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COVER: This photo is also the cover photo of a book just published by the Bureau of Commercial Fisheries--"The Fisheries of North America," an appraisal of the fishing industries of Canada, Mexico, and the United States and of many aspects of the world's fisheries. Experts in government, private industry, and international organizations contributed to it. The book contains the proceedings of the North American Fisheries Conference held in Washington, D. C., April 30-May 5, 1965.

Contributors view the sea as a source of food that now is only partially used. A few species are sought intensively, while many others are ignored. The experts believe the sea can give up much greater harvests than it does now--without exhausting its resources; it can be a lifeline to the future for the world's hungry millions.

The growing science of oceanography to explore the sea and its riches is discussed in one chapter and a special 7-page photo section illumines the subject. There are photos of submarines used to learn the sea's secrets, balloons to spot fish, and electronic gear to collect data on currents, temperature, atmospheric pressure--and to reveal the location and quantity of fish. All these devices are being used to make fish catches more predictable and the fishing industry more efficient.

In addition to discussing North American fisheries, the book reports that today the volume of fish and fishery products traded internationally is about as large as the international trade in meat. Two of every five tons of fish caught are exported. For some nations, fishing is a vital industry. As world demand for fish increases, it complicates the problem of conserving some species. Because the fisheries of the world belong to mankind, some observers believe there is a need for an international organization to protect the sea's resources and the rights of all nations to them. The role of the Fisheries Department of the United Nations' Food and Agriculture Organization is outlined.

The American contributors provide a comprehensive analysis of the domestic fishing industry--from finding fish to marketing new fishery products. They record the changing picture in the United States, where only 10-15 years ago the bulk of fish products was marketed in stores along the coasts and today every supermarket has a seafood department. The important role of the States in making fishing laws and effects of these laws on the industry are discussed.

The book contains a summary by Donald L. McKernan, Director of the Bureau of Commercial Fisheries.

"The Fisheries of North America," 80 pages, illustrated, costs 65 cents and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

COMMERCIAL FISHERIES *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

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The Bureau of Commercial Fisheries and
The Bureau of Sport Fisheries and Wildlife
make up The Fish and Wildlife Service of
The United States Department of the Interior.

Throughout this book, the initials BCF stand for
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Director McKernan Leaves BCF for State, November 1; Crowther His Successor

Donald L. McKernan, Director of the Bureau of Commercial Fisheries since 1956, has been named Special Assistant to the Secretary of State for Fisheries and Wildlife, and will leave BCF about November 1. He succeeds William C. Herrington, who is retiring after 15 years with State.

Secretary of the Interior Stewart L. Udall announced that BCF Deputy Director Harold E. Crowther will replace Mr. McKernan.

Secretary Udall said that the past 10 years have been significant ones for the Nation's commercial fishing industry. "Major developments have occurred in government efforts in the commercial fisheries during Mr. McKernan's tenure as Director," he said, citing as examples the enactment by Congress of financial assistance programs, the launching of the National Oceanographic Program in which the Bureau plays a key role, and the Bureau's increasing efforts to resolve the myriad problems arising out of international use of the fishery resources of the high seas.

In his new role, Mr. McKernan will advise the Secretary of State on policy matters in the field of fisheries and wildlife. He will represent State in meetings with the fishing industry, fish and wildlife conservation organizations--and the United States in meetings with representatives of other governments on fish and wildlife matters.

When appointed Director in 1956, Mr. McKernan was the Administrator, Territory of Alaska. Before that, for 3½ years, he was Assistant Director of the Fish and Wildlife Service's Pacific Oceanic Fishery Investigations in Honolulu, Hawaii. He was born in Eugene, Oregon, and attended schools in Seattle, Washington. He has a BS from the Uni-



Donald L. McKernan

versity of Washington and has completed his course requirements for a Ph. D. from that school. From 1945-1952, he was Director of Research for the Oregon Fish Commission. During that period, he had a special Army assignment to study the freshwater fisheries and shellfish resources of Japan.

President Eisenhower appointed him in 1957 a member of the United States section of the Great Lakes Fishery Commission, and member and chairman of the United States section of the Passamaquoddy Fisheries Board of the International Joint Commission. In 1961, he was elected chairman of FAO's First World Conference of Fish in Nutrition, held in Washington. And, in 1962, Mr. McKernan was awarded the Fisheries Service Award of the National Fisheries Institute "in recognition of long and devoted service to the American Fishing Industry."

CROWTHER TO TAKE HELM

In selecting Mr. Crowther, Secretary Udall cited his 30 years' experience in fisheries research and administration in many parts of the Nation. "Half this time," the Secretary said, "was in the fishing industry, and the remainder in the Bureau of Commercial Fisheries and its parent agency, the Fish and Wildlife Service, in positions of increasing responsibility, which eminently qualify him for this position."

Born in Laurel, Maryland, Mr. Crowther received his BA in 1933 and his MS in 1935 from the University of Maryland. In 1936, he was employed by a private company to conduct research on fishery products. In 1943, he joined the Marine Corps and served as

an officer in the South Pacific. From 1946 to 1949, and from 1953 to 1956, he was employed in the fishing industry in Massachusetts. At first, he was a research scientist; and later an executive. In 1949, he entered Govern-



Harold E. Crowther

ment service. For 4 years he served as Chief, Exploratory Fishing Section, and Chief, Technology Section, Fish and Wildlife Service. He came back to the Fish and Wildlife Service in April 1956 as BCF's Coordinator of the Saltonstall-Kennedy Program. In November 1957, he was promoted to Chief, Division of Industrial Research and Services; in June 1961, he became Assistant Director (now Deputy Director).

In 1961, President Eisenhower appointed him a U. S. Commissioner of the International Pacific Halibut Commission and he continues to serve in that capacity. He has served too in international fisheries conferences.



Gerald Howard Appointed BCF Pacific Southwest Regional Director

Gerald V. Howard has been appointed Director of the Pacific Southwest Region. He succeeds Donald R. Johnson, who left to take over the Bureau's Pacific Northwest Region in Seattle.

Howard headed BCF's Tuna Resources Laboratory at La Jolla, Calif., and now moves

to Region headquarters at nearby Terminal Island. The Pacific Southwest Region includes California, Nevada, Utah, Colorado, Arizona, and New Mexico.

Howard will direct research efforts to locate and catch tuna off the West Coast--and to study the relationship between ocean circulation and fish populations. Changes in abundance of Pacific sardines and anchovies hold particular interest for his office.

McVey is New Attache in Copenhagen

Robert W. McVey, a BCF Foreign Fisheries Specialist, has been named Assistant Regional Fisheries Attaché (Europe) for the Department of State. He will take up his post in Copenhagen about November 1. He is expected to return to BCF after completing his Copenhagen tour.

McVey obtained his MA in fisheries at the University of Missouri in 1955, then worked for the Missouri Conservation Commission two years before joining BCF in Juneau, Alaska, as research biologist.



"SEAFOOD SLIMMERS," A NEW BCF RECIPE BOOKLET

"Seafood Slimmers," a new, 16-page, full-color, diet booklet prepared by the U. S. Department of the Interior's Bureau of Commercial Fisheries is available for distribution.

This 4-color sales document on the preparation of low-calorie fish and shellfish dishes will be released in connection with the Bureau-industry promotional program for the October "Fish and Shellfish Parade."

Called Fishery Market Development Series #7, it may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, for 25 cents a copy.

UNITED STATES -- EVENTS AND TRENDS

Industrial Fishery Products

MIDYEAR PRODUCTION OF FISH MEAL, OIL, AND SOLUBLES DECLINES FROM 1965 FIGURES

During July 1966, 29.2 million pounds of marine animal oils and 32,469 tons of fish meal were produced in the United States, the Bureau of Commercial Fisheries reports. Compared with July 1965, this was a decrease of about 12.4 million pounds of marine animal oils and 17,615 tons of fish meal and scrap. Fish solubles production amounted to 13,438 tons--a decrease of 5,181 tons compared with July 1965.

Product	July		Jan.-July		Total 1965
	1/1966	1965	1/1966	1965	
	(Short Tons)				
Fish Meal and Scrap:					
Groundfish	1,030	1,966	6,354	7,411	10,696
Herring	2,799	4,297	4,877	6,731	12,932
Menhaden 2/	24,124	39,286	70,543	105,930	175,959
Tuna and mackerel	2,907	2,790	17,539	13,815	25,399
Unclassified	1,609	1,745	5,927	11,075	17,360
Total 3/	32,469	50,084	105,240	144,962	242,346
Fish Solubles:					
Menhaden 2/	11,040	16,254	33,639	42,013	73,181
Unclassified	2,398	2,365	13,232	12,130	21,658
Total	13,438	18,619	46,871	54,143	94,839
	(1,000 Pounds)				
Oil, body:					
Groundfish	225	603	1,060	1,689	2,441
Herring	2,354	4,017	3,332	5,052	8,543
Menhaden 2/	25,024	35,930	80,434	107,960	175,202
Tuna and mackerel	527	582	2,537	2,164	4,793
Unclassified (inc. whale)	1,027	435	2,594	1,929	4,521
Total oil	29,157	41,567	89,957	118,794	195,500
1/Preliminary data.					
2/Includes a small quantity of other species.					
3/Does not include a small quantity of shellfish and marine animal meal and scrap because production data are not available monthly.					

PRODUCTION^{1/} BY AREAS, AUGUST 1966

Area	Meal	Oil	Solubles
	Short Tons	1,000 Lbs.	Short Tons
August 1966:			
East & Gulf Coasts . . .	23,642	19,400	9,943
West Coast ^{2/}	3,075	743	1,775
Total	26,717	20,143	11,718
Jan.-Aug. 1966 total . .	131,957	110,100	58,589
Jan.-Aug. 1965 total . .	194,873	156,574	72,133
1/Does not include crab meal, shrimp meal, and liver oils.			
2/Includes American Samoa and Puerto Rico.			

□□□□□□□□

Can Shipments Rise Slightly

A total of 1,485,577 base boxes of steel and aluminum was consumed to make cans shipped to fish and shellfish canning plants in January-June 1966. This compares with 1,447,386 base boxes used during same period in 1965. Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area of 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by use of the factor 23.7 base boxes per short ton of steel. Source: U. S. Department of Commerce, Bureau of the Census.



Wholesale Prices and Indexes for Edible Fish and Shellfish, August 1966

The August 1966 wholesale price index for edible fishery products (fresh, frozen, and canned) was down 0.2 percent from July. August prices were somewhat mixed. At 129.5 percent of the 1957-59 average, the overall index was 13.3 percent higher than August 1965--and, with very few exceptions, prices were higher for nearly all items.

The subgroup index for drawn, dressed, or whole finfish dropped 2.8 percent from July--caused largely by a sharp drop in prices at Boston for ex-vessel large haddock (down 23.5 percent). Also, prices were slightly lower at New York City for fresh and frozen western dressed halibut and fresh salmon--but higher for Great Lakes fresh fish. Compared with August 1965, prices were sharply lower for haddock (down 25.6 percent) because of better supplies, and slightly lower for halibut (down 5.0 percent). As a result, the subgroup index this August was down 1.2 percent from 1965. But August 1966 prices were substantially higher for yellow pike (up 27.1 percent) and whitefish (up 15.7 percent).

The August 1966 subgroup index for fresh processed fish and shellfish rose 0.6 percent from July. Prices were higher for fresh haddock fillets (up 2.3 percent) at Boston and South Atlantic fresh shrimp (up 0.9 percent) at New York City. Prices remained unchanged

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, August 1966 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1957-59=100)			
			Aug. 1966	July 1966	Aug. 1966	July 1966	June 1966	Aug. 1965
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					129.5	129.7	127.2	114.3
Fresh & Frozen Fishery Products:					133.5	133.3	128.3	117.4
Drawn, Dressed, or Whole Finfish:					131.8	135.6	121.5	133.4
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.14	.18	109.9	143.6	94.8	147.7
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.48	.49	142.0	144.2	142.7	149.4
Salmon, ldn., lge. & med., drsd., fresh or froz.	New York	lb.	.98	.96	136.2	134.5	131.3	127.5
Whitefish, L., Superior, drawn, fresh	Chicago	lb.	.74	.63	109.7	94.0	79.8	94.8
Yellow pike, L., Michigan & Huron, rnd., fresh	New York	lb.	.89	.70	145.7	114.6	99.9	114.6
Processed, Fresh (Fish & Shellfish):					130.9	130.1	132.4	108.8
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.46	.45	111.8	109.3	99.6	99.6
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.11	1.10	130.1	128.9	134.7	100.8
Oysters, shucked, standards	Norfolk	gal.	8.00	8.00	134.9	134.9	134.9	120.2
Processed, Frozen (Fish & Shellfish):					131.5	128.0	125.5	104.8
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.43	.43	109.0	109.0	109.0	98.8
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.40	.40	115.8	115.8	114.3	111.4
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.33	.33	114.0	114.0	114.0	108.7
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.20	1.15	142.3	136.3	132.8	100.8
Canned Fishery Products:					122.9	123.8	125.6	109.4
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.50	28.50	124.2	124.2	124.2	106.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	12.95	13.20	115.0	117.2	121.5	102.6
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	8.00	8.00	135.6	135.6	135.6	120.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.25	10.25	131.5	131.5	131.5	131.5

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
Source: U. S. Department of Labor, Bureau of Labor Statistics.

for standard shucked oysters. Compared with August 1965, the subgroup index was up 20.3 percent because of substantially higher prices for all items. August 1966 fresh shrimp prices were up 29.1 percent from August 1965, and were higher for small haddock fillets (up 12.2 percent), and oysters (up 12.2 percent).

The subgroup index for processed frozen fish and shellfish rose 2.7 percent from July to August solely because of higher prices at Chicago for frozen shrimp (up 4.4 percent); for other items in the subgroup, there was no change. The index was 25.5 percent higher than August 1965. Prices were higher than

in 1965 for all items in the subgroup--substantially higher for frozen shrimp (up 41.2 percent) and flounder fillets (up 10.3 percent).

The only change in August 1966 prices for canned fishery products was in canned tuna--down 1.9 percent from July. As a result, the subgroup index dropped 0.7 percent. But compared with August 1965, the index was up 12.3 percent. Prices were higher than in August 1965 for canned pink salmon (up 16.3 percent), California jack mackerel (up 12.2 percent), and canned tuna (up 12.1 percent). Prices for canned Maine sardines remained unchanged during July and August 1966. (U. S. Department of the Interior, Bureau of Commercial Fisheries, Fishery Market News Service.)



STATES

Alabama

LANDINGS AND FISHERY TRENDS, 1965

During 1965, fishery landings in the Alabama coastal area (including the Alabama-Tombigbee River system) totaled 17.8 million pounds valued at \$5.0 million--up 18 percent in quantity and 25 percent in value over 1964. Leading items in 1965 were: shrimp (9.6 million pounds, heads-on weight), red snapper (2.5 million pounds), blue crab (1.8 million pounds), and mullet (1.5 million pounds)--87 percent of the total 1965 landings was made up of these items.



Shrimp: The 1965 shrimp landings of 9.6 million pounds (heads-on weight) valued at \$3.6 million were up 2.4 million pounds from the previous year; the ex-vessel value was up \$1.0 million, or 39 percent. Brown shrimp made up 80 percent of the landings, white, 19 percent, and pink, 1 percent. Ex-vessel shrimp prices were high through May with few fluctuations except for minor price increases for the larger sizes. Prices declined on all sizes during June after the brown shrimp season opened. Gradual price increases began in late August 1965 and continued through the end of the year.

Oysters: The 1965 oyster landings of 492,000 pounds of meats were valued at \$207,000. Landings were down 51 percent from 1964, the decline due to pollution of oyster reefs in the western portion of Mobile Bay during the spring season. The demand for shucked oysters was very strong during the fall season after hurricane "Betsy" disrupted the harvesting of oysters in Louisiana and Mississippi waters.

Crab: Landings of hard blue crab in 1965 were about 1.8 million pounds with an ex-vessel value of \$153,000, only a slight increase from 1964, but the value was up 39 percent. The value increase was due to a greater quantity of pot-caught crabs. Crabs taken by pots command higher prices than those caught by otter trawls incidental to shrimp fishing.

Alabama Landings, 1965 and 1964				
Species	1965		1964	
	Quantity	Value	Quantity	Value
	Lbs.	\$	Lbs.	\$
Fish				
Bluefish	5,401	508	10,973	691
Buffalofish . . .	100,285	11,968	67,695	6,937
Catfish	38,578	10,168	45,253	11,421
Croaker	15,219	1,258	3,195	271
Drum:				
Black	3,079	212	17,312	1,429
Red or redfish .	3,658	553	19,295	3,041
Flounder	300,669	46,651	162,088	24,836
Grouper	388,622	42,664	304,542	43,524
Jewfish	134,049	13,399	118,450	11,747
King whiting or				
kingfish	607,741	36,772	574,759	28,892
Mullet	1,508,490	69,188	1,071,981	55,620
Paddlefish or				
spoonbill cat .	16,552	2,069	9,962	1,270
Pompano	1,677	934	1,645	827
Sea catfish . . .	19,286	1,322	12,801	684
Sea trout:				
Spotted	53,769	13,866	64,601	16,472
White	108,055	6,840	65,120	3,264
Sheepshead:				
Fresh-water . .	9,550	1,378	15,401	2,319
Salt-water . . .	15,578	1,182	34,711	2,374
Snapper, red . .	2,494,945	707,302	2,392,875	685,133
Spanish mackerel	14,326	1,782	74,139	8,358
Spot	14,892	744	13,659	701
Other fish . . .	261	19	485	34
Total fish . .	5,854,682	970,779	5,080,942	909,845
Shellfish				
Crabs, blue, hard	1,812,338	153,409	1,761,725	110,335
Shrimp, heads-on	9,619,542	3,654,173	7,214,738	2,629,814
Oysters	492,498	206,685	1,005,260	324,125
Squid	6,034	516	4,168	350
Total shellfish	11,930,412	4,014,783	9,985,891	3,064,624
Grand total . .	17,785,094	4,985,562	15,066,833	3,974,469

Note: Landings are round weight for all species except oysters which are in pounds of meats (8.75 pounds per gallon).

Finfish: Landings of finfish (salt- and fresh-water) at Alabama ports during 1965 were about 15 percent higher than in 1964 due to increased catches of nearly all major species. Red snapper was the leading species accounting for 43 percent of the total finfish landings and 73 percent of the value. Fresh-water fish species caught in the Tombigbee, Alabama, and Mobile river systems were landed in larger quantities than in 1964. Except for mullet, prices for most species were relatively high with little price fluctuations during the year. Heavy mullet landings on occasions resulted in lower prices.

Local shipyards operated at capacity during 1965, and there was a trend to construct

more steel vessels of greater horsepower. Local shipyards built 14 new vessels for the Alabama fishing fleet during 1965.



Alaska

PINK SALMON FISHING EXCELLENT IN SOUTHEASTERN ALASKA

The Alaska Department of Fish and Game in July 1966 extended fishing periods in many areas of southeast Alaska in order to harvest the bountiful run of pink salmon. The best fishing spot at that time was Frederick Sound, where purse seiners were enjoying excellent catches.

KODIAK SALMON CANNERIES AT PEAK ACTIVITY

Kodiak has been experiencing one of the best salmon seasons on record. As of July 31, 1966, the pack had reached 443,000 cases. By comparison the 1962 pack, which was the highest in over 20 years (711,900 cases), amounted to only 346,000 cases by July 31 of that year. If the salmon run were to hold up, it was believed that 1966 could just be the best season since 1939.



California

1966 SHRIMP FISHING SEASON OFF NORTHERN CALIFORNIA CLOSES

Commercial shrimp fishing in Area A, extending from False Cape, Calif., to the Oregon-California border, was closed by the California Department of Fish and Game effective August 8, when the catch quota of 1,250,000 pounds for the 1966 season was reached.

The Fish Commission of Oregon cooperated with California by making it unlawful to land or have in possession shrimp taken from the waters of the Pacific Ocean south of 42° N. latitude (Oregon-California boundary line) from midnight August 10, 1966, to May 1, 1967.

The closure to shrimp fishing off the California coast had no effect on shrimp fishing off the Oregon coast. Oregon's 1966 shrimp season was not scheduled to close until October 31, 1966. (Oregon Fish Commission, August 8, 1966.)

Note: See Commercial Fisheries Review, October 1965 p. 48.

SURVEYS PELAGIC FISH POPULATION

For 3 weeks in June, the Department of Fish and Game's research vessel M/V *Alaska* explored the coastal waters off southern California and northern Baja California, Mexico--from San Martin Island to Point Conception and seaward to the 1,000-fathom depth contour. Objectives: (1) To survey schooling fish of pelagic environment in California Current System using echo sounder and midwater trawl; (2) to develop techniques for making this type of survey routine.

During the cruise, echo sounder transect lines were traversed from shore to the 1,000-fathom contour; hourly fixes were plotted, and the number of schools detected were entered between fixes; records were kept of visual "breezing" schools during day and "fireball" schools at night; a small midwater trawl was fished for species identification and sampling, and hourly sea surface temperature records were kept, together with fish school counts and vessel location.

The echo sounder covered 1,910 miles and detected 752 northern anchovy (*Engraulis mordax*), 17 jack mackerel (*Trachurus symmetricus*), 9 Pacific hake (*Merluccius productus*), and one Pacific bonito (*Sarda chiliensis*) schools; 134 other anchovy schools were seen.

Northern Anchovies: Anchovies were by far the most abundant and widely distributed species. They appeared as "plumes" on the echo sounder at depths from 5 to 80 fathoms, with most schools at 8 to 14 fathoms. Sightings, compared with echo traces from the same school, indicated some schools probably contained 15 or more tons.

In northern Baja California waters, echo sounding traversed 416 miles and detected 52 anchovy schools. Fish were very scarce except in Todos Santos and Soledad Bays. In Soledad Bay extremely large concentrations were present. During night-time visual scouting,

72 large "fireball" schools were observed. Midwater trawl tows sampled small and medium size fish (95-125 millimeters, or 8.7 to 4.9 inches).

In southern California waters 1,494 miles were covered and 700 anchovy schools detected. An additional 62 "breezing" schools were visually observed. The population bulk was distributed 25-80 miles offshore near the outer northern Channel Islands (includes Santa Rose, Santa Cruz, San Miguel, and San Nicolas). The center of abundance was Santa Cruz Basin, where up to 62 schools were detected in 45 minutes. Many large schools were also found south of San Miguel Island. No schools were found more than 80 miles offshore.

Fish were quite scarce in coastal waters from San Diego to Point Conception. The few schools detected were located much deeper than offshore fish. Samples consisted of predominately small fish 90-110 millimeters (3.5 to 4.3 inches) long compared to offshore fish which averaged about 130 millimeters (5.1 inches).

JACK MACKEREL: Most of the 17 jack mackerel schools detected were located over rocky shoal areas on Tanner and Cortes Banks. Identification was made by hook and line fishing and observation of purse seiner catches. Attempts to sample with midwater trawl failed because fish avoided net.

PACIFIC HAKE: All but one of the 9 hake schools detected were located in northern Baja California. The other school was located near San Miguel Island in southern California.

For nearly 3 weeks in July, the M/V Alaska surveyed the smaller pelagic fish of the California current system for distribution and density. It sought to determine size and age composition of these species and to develop better survey methods. It operated in the coastal waters of central California from Point Reyes to Point Arguello from shore to the 1,000-fathom depth contour.

An echo sounder operated continuously over transect lines spaced about 20 miles apart perpendicular to the coast. Schools appearing on the echo sounder were identified by midwater trawl sampling or echo trace characteristics, and a record was also

kept of visually observed schools. All work was conducted during daylight hours except for two nights.

The echo sounder traversed 933 miles and detected 102 anchovy (Engraulis mordax), 73 whitebait smelt (Allosmerus elongatus), 7 rockfish (Sebastes sp.), 2 Pacific hake (Merluccius productus), and 55 unidentified schools. Night visual scouting accounted for 29 anchovy schools. Many small scattered echo traces of hake, whitebait smelt, and visual anchovy scatters were also recorded but were too small or dispersed to be counted as schools. The inshore areas were most productive in marine life. Most fish schools, birds, and porpoises were located within 15 miles offshore.

ANCHOVIES: Anchovies were found from Pigeon Point to Point Arguello. Their distribution was patchy, with no extensive areas of heavy concentration found in southern California in June. Most school groups covered less than 3 linear miles and contained from 2 to 6 schools. The largest numbers of schools were recorded off Cape San Martin and Point Sal, where 19 and 22 schools were logged, respectively, per 10 miles of transect. The only evidence of a continuous distribution was between Point Buchon and Point Arguello. There, schools were distributed over an area extending 30 miles offshore. All visual sightings and surface scatters were found there along with many birds, porpoises, and sea lions. A smaller area of concentration was found 10 miles off Cape San Martin. No other concentrations of fish were detected.

Anchovy echo traces were considerably larger than those of previous surveys in southern California. All schools were located within 20 fathoms of the surface and appeared as "plumes." Most fish sampled were large adults ranging from 125 to 150 millimeters (4.9 to 5.9 inches) long.

WHITEBAIT SMELT: Locally abundant near mouth of San Francisco Bay--73 small schools plus uncountable scattered echo traces were detected. Fish were easily sampled by midwater trawl with catches of up to 100 pounds per 20-minute tow.

ROCKFISH: Schools were detected over many shallow rocky areas of Monterey Bay and Point Sal. Midwater trawl tows at Point Sal produced small shortbelly (Sebastes jordani), juvenile chilipepper (S. goodei) and

a few bocaccio (*S. paucispinus*). Many of the 55 unidentified echo-sounder schools were probably rockfish.

PACIFIC HAKE: Found in close association with whitebait smelt usually 1 to 2 fathoms off bottom. They appeared as small groups spaced irregularly from 20 to 50 yards apart. A series of these groups was counted as a school. One school covered over a mile near San Francisco Light Vessel; a smaller one was found off Halfmoon Bay. Many isolated groups not counted as schools were found near mouth of San Francisco Bay. Trawl samples contained large adults.

Adverse weather conditions lasting one week hampered operations in Monterey Bay area. A brief survey of outer Channel Islands and Santa Cruz Basin was made in southern California while the vessel was returning to port. The heavy concentrations of anchovies found there in June had disappeared. Only scattered schools were detected and no signs of fish were present.

Note: See Commercial Fisheries Review, August 1966 p. 19.

ALBACORE LANDINGS DOWN IN CALIFORNIA, UP IN OREGON

Landings of albacore tuna in southern California in July dropped to record low of 630 tons, 235 tons below July 1965 figure, the previous record postwar low since 1945. Conversely, the Pacific Northwest experienced one of the best early albacore seasons since 1959. Oregon landings through July would have exceeded estimated 262 tons but brief price dispute in mid-July stopped the fishing.

ANCHOVY REGULATIONS SET

The Fish and Game Commission has continued the experimental commercial fishery for the take and reduction of anchovies. The season runs from October 1, 1966, through April 30, 1967, or until the quota of 75,000 tons is reached. The quota is the same as last year's, the first year of the experimental fishery, when only 17,000 tons were landed. If the quota of 35,000 tons is reached in the offshore zone ("zone four"), fishermen must come to the Commission and ask for an additional quota.

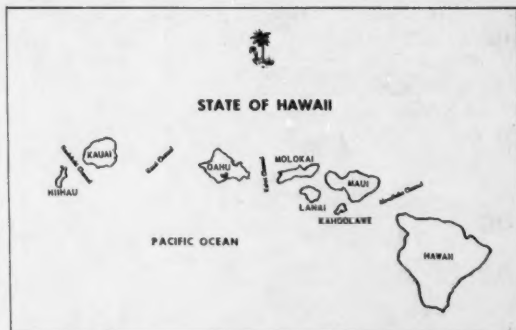
The Department of Fish and Game will check the catch continuously, estimate date quota will be reached, and give 48 hours' notice on the closing date. The Commission may close the season, after 48 hours' notice, any time it determines the anchovy resource is in danger of depletion or waste.



Hawaii

1965 FISHERY LANDINGS

Commercial landings of fish and shellfish in 1965 totaled 19.6 million pounds valued at \$3.6 million. Compared with 1964, this was a gain of about \$6.9 million pounds, up 54.3 percent in quantity, and \$754,434, up 26.5 percent in value. Tuna (albacore, bigeye, bluefin, little tuna, skipjack, and yellowfin) accounted for 89.1 percent of quantity and 74.0 percent of value.

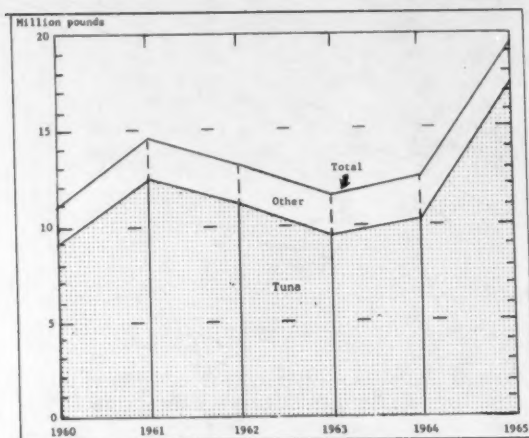


Skipjack tuna is the major item of the fishery. The catch in 1965 totaled 16.2 million pounds valued at \$2.0 million compared with 9.0 million pounds worth \$1.2 million in 1964.

The higher valued bigeye and bluefin tuna landings amounted to 773,872 pounds with ex-vessel value of \$471,006 in 1965--down somewhat from 1964 landings of 839,485 pounds valued at \$493,568.

The 1965 Hawaiian landings also included 497,626 pounds of yellowfin tuna, 449,571 pounds of bigeye scad, 384,955 pounds of striped marlin, 233,530 pounds of snapper, 190,047 pounds of jack mackerel, and 171,753 pounds of black marlin.

Oahu led the Hawaiian Islands with 15.6 million pounds, 79.7 percent of the total. The



Island of Hawaii was next with 2.8 million pounds, followed by Maui with 957,000 pounds. The remainder was landed on Islands of Molokai, Kauai, and Lanai.

The 1965 catch was taken by 744 fishermen. Fishing craft included 57 vessels (craft of 5 net tons and over), 324 motorboats, and 23 other boats.

Note: See *Commercial Fisheries Review*, February 1966 p. 20.



Oregon

CLAM WASTAGE ENDANGERS 1967 CROP

The wastage of small and damaged razor clams during the summer season reached staggering proportions and endangers next year's crop, reports the Fish Commission. During the tide series, July 16-22, about 115,000 clams were wasted. Many of them were damaged in digging and were discarded illegally by diggers seeking to avoid the chore of cleaning crushed clams. But most were under 3 inches and were therefore discarded.

Small clams in their first year are especially abundant about mid-August and usually are less than 3 inches long. Serious damage at this age will result in fewer good-sized clams the following year when they average $4\frac{1}{2}$ inches.

The Fish Commission has circulated a questionnaire explaining the problem, suggesting total beach closure from Tillamook

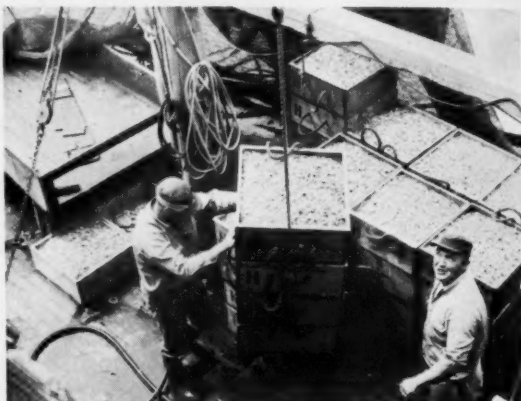
Head to the Columbia River from July 15 to August 31, and asking the opinions of diggers. The closure would reduce the harvest of small clams and resulting wastage by at least 50 percent, the Commission says.



Texas

FISHERY LANDINGS, 1965

During 1965, fish and shellfish landings at Texas ports amounted to 154.2 million pounds, valued at \$35.6 million. This was 9.3 million pounds (6.3 percent), and \$6.1 million (20.4



Unloading shrimp.

Texas Fisheries Landings, 1964-1965				
Species	1965		1964	
	Quantity Lbs.	Value \$	Quantity Lbs.	Value \$
Fish				
Menhaden	61,865,800	1,121,624	66,686,400	822,024
Snapper, red	2,211,800	628,137	2,249,800	631,200
Seatrout, spotted . .	1,176,200	320,859	977,700	251,681
Drum:				
Black	1,470,000	136,039	1,409,300	124,508
Red (redfish)	532,500	137,872	446,900	111,793
Other fish	1,454,300	148,991	1,245,600	154,308
Total fish	66,710,600	2,493,522	73,015,700	2,095,514
Shellfish				
Crabs, blue	3,622,200	286,036	2,484,800	175,552
Lobster (Bulldozer) .	100	30	-	-
Oysters	4,835,500	1,538,482	3,357,100	1,092,582
Shrimp (heads-on):				
Brown and pink . . .	62,698,000	25,539,809	47,432,400	18,969,673
White	14,225,700	5,692,838	18,617,100	7,173,287
Other	100,700	8,058	3,630	1,151
Squid	23,900	2,390	23,500	2,350
Total shellfish . . .	85,510,100	33,067,643	71,918,500	27,414,585
Grand total	154,220,700	35,561,165	144,934,200	29,510,109

1/Does not include bait shrimp.

Note: Oysters are reported in pounds of meats (8.75 pounds per gallon). All other species are shown in round weight. The weight of heads-on shrimp was determined by multiplying heads-off weight by the following factors: brown, 1.61; pink, 1.60; white, 1.54; royal red, 1.80; and sea bobs, 1.53.

percent) above 1964. The increase was due mainly to larger catches of shrimp. Other valuable fishery landings were menhaden, red snapper, sea trout, and drum.



Tennessee

MUSSEL HARVEST UP IN 1965

The 1965 mussel shell harvest in the Tennessee River totaled 2,418 tons, worth \$346,000 to mussel fishermen, TVA reports. Although somewhat larger than the 2,100 tons harvest-

ed in 1964, it was much smaller than the peak harvests of the late 1940s and early 1950s, which usually totaled over 10,000 tons. Of the 1965 harvest, 1,978 tons came from Kentucky Reservoir and the tail-water below Kentucky Dam, 246 tons from north Alabama reservoirs, and 194 tons from Chicamauga Reservoir. Since the mid-1950s, nearly all the mussel shells have been exported to Japan, where cores cut from them are put into oysters for production of cultured pearls.

A final report on TVA's 3-year study of causes and possible solutions for the declining mussel harvests is expected soon.



MIDDLE ATLANTIC OYSTER FISHERY

The most valuable fishery resource of the Middle Atlantic region (N. Y., N. J., Del., Penn., Md., and Va.) is the oyster, despite a serious decline in its abundance along the Atlantic Coast beginning in the early years of this century. Its closest competitor in total dollar value is the clam. The annual oyster harvest, which in recent years has ranged from 28 to 34 million pounds of meats worth from \$20 to \$24 million to the oystermen, continues its downward trend. In 1962, 22 million pounds were harvested; in 1963, 19 million pounds. This region produces nearly half of the Nation's domestic supply of oysters despite the fact that all 20 coastal States produce oysters--and its oysters command a higher price on the market than those from other regions.

The eastern oyster is a single commercial species found from Canada to the Texas border. It grows in shallow water, but sometimes in depths of 20 to 30 feet. Natural oyster beds are depleted in many parts of the region; and except in Maryland, where most of the harvest still comes from public grounds, the major part of the oysters are taken from private, leased beds. In Virginia, New Jersey, and Delaware, most "seed" oysters for private industry are grown on natural seed beds managed by the State. Oysters are harvested with dredges, tongs, and by hand.



--Conservation Bulletin 17, *The Big Bite*
(Commercial Fisheries of the Middle Atlantic Coast),
U. S. Fish and Wildlife Service, Washington, D. C.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

Alaska Fishery Investigations

KING CRAB TAGGING IN BERING SEA AND NORTH PACIFIC

The Bureau of Commercial Fisheries research vessel John R. Manning was in the Shumagin Islands-Alaska Peninsula region tagging king crab during July 1966. Despite marginal weather conditions, 4,731 tags were released by the middle of that month. Eleven tags were returned to the Bureau's Auke Bay Biological Laboratory for processing during July. Six tags released in 1964, 3 released in 1963, and 1 Russian tag were included in the returns.

The vessel Sonny Boy completed in July the planned station pattern in the Bering Sea. The vessel occupied 90 stations, resulting in the release of 1,150 tagged male king crab. Upon completion of the station pattern, the Sonny Boy intensified the tagging portion of the program in an attempt to release an additional 4,000 tagged male crab.

Size frequency data and shell condition information were compiled from the first 60 stations sampled by the Sonny Boy. These preliminary tabulations indicate large quantities of crab less than 110 millimeters (4.3 inches) in length. The crab found were primarily recent molt crab, with skip-molt crab occurring frequently.



Alaska Fisheries Explorations and Gear Development

BOTTOMFISH EXPLORATIONS OFF SOUTHEAST ALASKA

The research vessel Commando, chartered by the U. S. Bureau of Commercial Fisheries, left Juneau on July 18, 1966, for a 52-day exploratory bottomfish survey. Explorations during late July were conducted along the continental slope and shelf (70-150 fathoms) off Southeastern Alaska between Cape Spencer and Cape Ommaney. Primary objectives were to

locate trawlable fishing grounds and commercial concentrations of Pacific ocean perch (Sebastes alutus).

* * * * *

PRELIMINARY GEAR STUDIES CONCLUDED

The first phase of experimental fishing with standard and modified shrimp try-nets by the Bureau's Alaska Exploratory Fishing Base was concluded this past July. Plans were being formulated for phase two which will test the standard and modified shrimp try-nets in the Kachemak Bay area. Operations will be conducted out of the Bureau's Auke Bay Biological Laboratory field station at Kasitsna Bay.

Note: See Commercial Fisheries Review, September 1966 p. 10.



Central Pacific Fisheries Investigations

FIND RARE BIGEYE TUNA OFF HAWAII

Fishermen aboard BCF's R/V Charles H. Gilbert caught and landed alive in Honolulu 89 young bigeye tuna. They were about 20 inches long--under a year old. These small ones are rarely seen and are not harvested.

Researchers aboard R/V Townsend Cromwell saw the fish playing around flotsam. A hurried message brought up the Gilbert, the Honolulu laboratory's other research vessel,

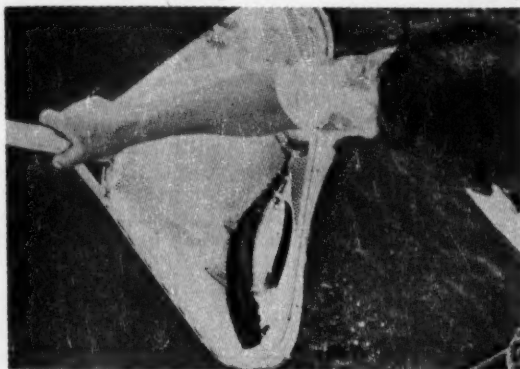


Fig. 1 - A technician descends into the baitwell to net the young bigeye tuna.

which is better equipped to transport live fish. The bigeye were taken by pole and line. Bigeye tuna have oversized eyes and long, slender pectoral fins sweeping back in a pronounced curve almost to the tail.



Fig. 2 - Ashore netted tuna being transferred to portable tank. The fish will be kept in the portable tank ready for transportation to larger tanks where they will be kept and used in several studies of tuna physiology and behavior.

Bureau scientists believe the bigeye can increase the information obtained from studies of other tunas--about vision, hearing, use of olfaction in food search, and how they maintain swimming depth. Bigeye have swim bladder; yellowfin have much smaller one; skipjack none.

Large and old bigeye tuna, caught at 400-600 feet throughout the tropical Pacific, make up about 20 percent of Japan's annual tuna landings. In recent years, heavy catches were made southeast of Hawaiian Islands. Bigeye are a premium food fish.

The most substantial U.S. catch of bigeye is in Hawaii, where long-line fleet took 336 tons in 1965. These were older fish caught deep. Bigeye command good prices. Small quantities are caught by the California fleet.



Great Lakes Fishery Investigations

LAKE ERIE YIELDS POOR HATCH OF WALLEYES, YELLOW PERCH

The 1966 hatch of yellow pike (walleyes) and yellow perch in Lake Erie was the second lowest average recorded in 10 years, says BCF's regional office in Ann Arbor, Mich. This preliminary evaluation is based on relative distribution and abundance of

young-of-the-year fish collected in the western basin. Trawling data through the end of 1966 may change estimate slightly--but outlook is discouraging. The "northeast" that pounded lake shoreline in late April 1966 during peak spawning period apparently had tremendous adverse effect on walleyes and yellow perch.

Trawl samplings reveal fairly good hatch of white bass and channel catfish. Only sheepshead among commercial species are enjoying an exceptionally good year.

Forage fish--including alewives, gizzard shad, spottails, and emerald shiners--are at about same levels of abundance in recent years.



North Pacific Fisheries Explorations and Gear Development

SURVEYS HAKE POPULATION

The BCF research vessel M/V John N. Cobb returned to Seattle in August after 4 weeks of exploratory fishing off the Pacific Coast between southern Vancouver Island, B.C., and northern Oregon.

Its primary objective was to determine distribution and availability of Pacific hake (*Merluccius productus*). Secondary objectives: (1) to assist commercial vessels in locating hake schools, (2) obtain biological data on hake, and (3) get additional data on availability of hake to Cobb pelagic trawl.

Echo-sounding transects were made to locate hake schools. When a school was located, it was fished with the Cobb pelagic trawl to determine the availability of hake, then sounded out to determine the school's dimensions. This information was passed on to commercial boats.

No large schools were found, but small ones were located, fished, and sounded. Most yielded less than 200 pounds of hake per-hour haul, but two produced catches of 1,870 and 5,278 pounds an hour. Both schools were located off Willapa Bay: the first in deep water along the 73- to 100-fathom depth contour covering an area of about 15 square miles; the second was found in shallower water along the 37- to 38-fathom contour and covered about 5

square miles. A third concentration was sounded out after commercial vessels located it on La Perouse Bank off Barkely Sound, B.C., near the 60-fathom depth contour. It covered about 8 square miles.

During the survey, Soviet vessels including BMRT's (stern trawlers), SRT's (side trawlers), and freezerships were observed. The larger freezerships were anchored between the 40- and 50-fathom contour between Point Granville and Destruction Island during the first part of the cruise; the SRT's worked west of them. During the latter part of the cruise, the Soviet fleet moved southward off Grays Harbor.

Note: See Commercial Fisheries Review, August 1966 p. 39.



Salmon

SALMON CAN PERPETUATE THEMSELVES IN NEW ENVIRONMENT

The results of a 12-year BCF experiment on the Wind River in southwest Washington show that adult spring chinook salmon of unknown origin can be captured on the Columbia River while returning to their birthplaces to spawn, be transferred to a tributary, and there establish a new "run" of salmon that will perpetuate themselves.

The experiment involved trapping salmon at Bonneville Dam on the Columbia each year from 1955-1963 and trucking them 30 miles to the Carson National Fish Hatchery on the Wind River. The fish were spawned artificially at the hatchery and 2 years later released into the river to start the long migration to the ocean. From 1959-1966, increasing numbers of salmon fought their way back upstream to their hatchery birthplace.

The information gained from the experiment will help to preserve and enhance the anadromous fish population in the Pacific Northwest and other areas.



U. S. Fishing Vessels

APPROVE 63% OF REQUESTS FOR VESSEL CONSTRUCTION SUBSIDY

Nearly 63 percent of the applications for subsidies under the U. S. Fishing Fleet Improvement Act from August 30, 1964, to July 31, 1966, have been approved, reports BCF's Branch of Loans and Grants.

The Act provides for paying construction-differential subsidies to help build fishing vessels of advanced design. The vessels must be capable of fishing in expanded areas and using newly developed gear. They must not be operated in a fishery if they will cause economic hardship to vessel operators already there.

The subsidy is equal to the difference in cost of building vessel in U. S. shipyard and estimated cost in foreign yard. The maximum subsidy is 50 percent of domestic cost.

The Act provides for public hearings before approval of application. The Maritime Administrator and Defense Secretary must approve it.

Applications Processed or Being Processed Between August 30, 1964, and July 31, 1966		
Item	No.	Subsidy Amount ^{1/}
Applications received . . .	70	\$ 16,987,000
Applications withdrawn before hearing	11	2,382,500
Hearings held	54	-
Applications approved after hearing	44	9,921,500
Applications withdrawn or dismissed after hearing .	5	697,500
Vessels under construction .	6	941,529
Vessels completed	2	273,029
^{1/} The amount of subsidy listed is an estimated amount in all cases except for completed vessels.		



Study Fish Oil Quality for Paints

The Seattle Technological Laboratory is cooperating with the technical committee of the Pacific Northwest Society for Paint Technology to expand the acceptability and use of fish oils in protective coatings, the field of

their largest single domestic use. The committee, called the Paint Club, will explore the application of several different fish oils in manufacturing alkyd resins. The resins then will be used as vehicles to formulate different paints--which will be tested and evaluated against a standard acceptable to the paint industry.

Methyl esters of menhaden, hake, herring, and albacore oils have been prepared for fatty acid analysis by gas chromatography. The data, and other routine analyses pertinent to paint, will be given the Paint Club. The researchers are trying to relate fish oil quality to formulation of the paint. The industry periodically suffers serious losses when, for no apparent reason, a particular lot of fish oil fails during paint manufacture. If the problem can be related to quality by lot analysis, the paint industry would accept fish oil much more readily.



Study Container for Air Shipping Fresh Fish

Scientists of the Gloucester Technological Laboratory met with officials of Trans World and United airlines to discuss problems in air shipping fishery products and the potential value to the fresh fish industry of expanding air shipments. Both airlines have promoted this in areas where salt water fish previously were unavailable and report good market possibilities. More promotion may be necessary, particularly in the far Midwest.

Both airlines have tried to develop a container system for fresh fillets without very satisfactory results. BCF can help here. It has already given them data on the thermal performance of insulated containers packed with gel refrigerant and the effects of temperature upon quality. A complication in the

container system design is that fillet tins leak. Although this is intolerable for air freight, the New England industry has not yet adopted a substitute--the flexible polyethylene bags used in the Northwest.

United has offered to make its facilities available to the Gloucester staff at no cost to conduct any project work involving air shipping.



Interest Rate on Fishery Loans Raised to 6 Percent

The Department of the Interior raised the interest rate on fishery loans from $5\frac{1}{2}$ percent to 6 percent effective October 1, 1966. Secretary Stewart L. Udall said the increase was required by law to make the rate at least equal to the average market yield on other public loans of comparable maturity.

Director Donald L. McKernan said the loan program was established by a section of the Fish and Wildlife Act of 1956, which authorizes the Secretary of the Interior to make loans for financing and refinancing operations of commercial fishing vessels and their gear.

Another provision of the loan fund legislation states that the purchaser of a new vessel must not cause economic injury to efficient vessel operators working in the area where the new vessel will be used.

Director McKernan said the loan program has filled the credit gap for fishermen. It has insured continued operation of their vessels and it is helping to upgrade and modernize the commercial fishing fleet of the United States.



FEDERAL ACTIONS

Department of the Interior

ADOPTS YELLOWFIN TUNA REGULATIONS

The Department of the Interior has adopted regulations to carry out recommendations of the Inter-American Tropical Tuna Commission (IATTC) designed to conserve the yellowfin tuna resources of the eastern tropical Pacific Ocean.

The IATTC, meeting in Guayaquil, Ecuador, April 19-20, 1966, recommended a total catch of 79,300 short tons during calendar 1966. It believes this limit will restore the stock to a maximum sustainable yield of about 91,000 tons annually within 3 years.

Interior's regulations became effective September 15, 1966, and the season closed on that date. Vessels that departed on fishing voyages after September 15 may not have on board or land yellowfin tuna in excess of 15 percent by weight of all tuna taken on the trip. The yellowfin season will reopen on January 1, 1967.

The regulations include restrictions applicable to fishing and cargo vessels and purchasers, reports and recordkeeping, persons and vessels exempted, and Fish and Wildlife Service and State officers designated as enforcement agents. The regulations appear in the Federal Register, September 10, 1966, pp. 11938-11944.

Note: See Commercial Fisheries Review, June 1966 p. 103.

* * * * *

HELPS ATLANTIC COAST OYSTER INDUSTRY

Interior Department has acted to help restore the hard-hit oyster beds of Virginia, Maryland, Delaware, New Jersey, and New York. Secretary Stewart L. Udall said about \$100,000 of Federal money is available under P.L. 88-309 of 1964 for research and such other activities that may be necessary to develop and propagate disease-resistant strains of oysters. The States must share one-third the cost of the projects. The 1964 law provides that the Secretary may give up to \$400,000 to aid the industry when he determines that a commercial fishery failure was due to a resource disaster.

Secretary Udall said: "The oyster mortality problem, due to natural and undetermined causes, presents a continuing threat to the economic stability of the remaining oyster industry in the five States involved."

The oyster problem began in 1957 and virtually wiped out stocks in Delaware Bay and Lower Chesapeake Bay. The disease-related deaths extended to oysters in other parts of Chesapeake Bay and to the Great South Bay of New York in 1965. These areas, Secretary Udall said, "face the prospect of an inadequate supply of marketable oysters for the 1967-1968 period."

* * * * *

APPLICATIONS FOR FISHING VESSEL LOANS

The following applications were received for loans from the U. S. Fisheries Loan Fund to help finance the purchase of fishing vessels:

Samuel Martin, Box 104, Seldonia, Alaska 99663, for a used vessel to fish for salmon, halibut, and crab. BCF published notice of application in Federal Register, August 20, 1966.

Richard N. Johnson, 14911 Washington St. SW., Tacoma, Wash. 98498, for a used 37-foot registered length wood vessel to fish for salmon, albacore, and Dungeness crab. Notice published September 3, 1966.

Levi McKinley, 1300 No. 2-A West Ninth, Juneau, Alaska 99801, for a used 34.7-foot registered length vessel to fish for halibut, salmon, and black cod. Notice published September 8, 1966.

Regulations and procedures governing fishery loans have been revised and no longer require an applicant for a new- or used-vessel loan to replace an existing vessel (Public Law 89-85; Fisheries Loan Fund Procedures--50 CFR Part 250, revised August 11, 1965).

Note: See Commercial Fisheries Review, September 1966 p. 78.

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APPLICATIONS FOR VESSEL CONSTRUCTION SUBSIDY

The following firms have applied for fishing vessel construction differential subsidies:

Boat Seafarer, Inc., New Bedford, Mass., a 90-foot overall wooden vessel, for scallops, groundfish, flounder, and lobster. BCF published notice of hearing in Federal Register, September 3, 1966.

Nicholas Rosa, 5207 Avenue T, Brooklyn, N. Y. 11223, a 50-foot overall length aluminum vessel to fish for lobster and crabs. Notice of hearing published September 17, 1966.

Clyde R. Potter, Belhaven, N. C., 86-foot overall steel vessel, for butterfish, flounder, porgies, sea bass, sea trout, swordfish, lobster, scallops, and shrimp, including royal red shrimp. Notice of hearing published September 3, 1966.

Harlan Truitt Murphy, Davis, N. C., 86-foot overall length steel vessel to fish for flounder, sea trout, porgies, king whiting, swordfish, croaker, shrimp (including royal red shrimp), scallops, and lobster. Notice of hearing published September 8, 1966.

* * * * *

NEW ANADROMOUS FISH PROGRAM CLARIFIED

The proposed regulations for a new Federal program to conserve and develop the Nation's anadromous fish resources were clarified and published in the Federal Register, September 10, 1966, the effective date.

They set forth the procedures the Interior Secretary will use when he provides financial and other assistance, through cooperative agreements, to State agencies and other non-Federal interests. The purpose of the assistance is to conserve, develop, and enhance the commercial and sport anadromous fish resources of the Nation--and Great Lakes fish that ascend streams to spawn.

Note: See Commercial Fisheries Review, July 1966 p. 105.



Eighty-Ninth Congress (Second Session)

Reported below are public bills and resolutions that may directly or indirectly affect the fisheries and allied industries. Introduc-



tion, referral to committees, pertinent legislative actions by the House and Senate, and signature into law or other final disposition are covered.

COMMERCIAL FISHERY RESOURCES SURVEY

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries held hearing on S. J. Res. 29, Aug. 24, 1966, to authorize and direct Secretary of the Interior to survey coastal and fresh-water commercial fishery resources of the United States, its territories, and possessions. Commissioner C. F. Pautzke testified.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries, Sept. 1, 1966, met in executive session and deferred further action on S. J. Res. 29, to authorize and direct the Secretary of the Interior to conduct a survey of the coastal and fresh-water commercial fishery resources of the United States.

COMMODITY PACKAGING AND LABELING

House Committee on Interstate and Foreign Commerce, Aug. 16-17 and 23-24, 1966, continued hearings on H.R. 15440 and related bills. Purpose of bills: to regulate interstate and foreign commerce by preventing use of unfair or deceptive methods of packaging or labeling of certain consumer commodities. Testimony from public witnesses.

House Committee on Interstate and Foreign Commerce, Sept. 7, 1966, continued hearings on H.R. 15440, and related bills, the proposed Fair Packaging and Labeling Act. Harold E. Crowther, Deputy Director, BCF, testified.

ESTUARINE AREAS--NATIONAL SYSTEM OF ESTUARINE AREA

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Mer-

chant Marine and Fisheries met in executive session Aug. 25, 1966, and approved for full committee action H. R. 13447 (amended). This would authorize Secretary of the Interior, in cooperation with States, to preserve, protect, develop, restore, and make accessible estuarine areas of the Nation which are valuable for sport and commercial fishing, wildlife conservation, recreation, and scenic beauty.

FISHERMEN'S COOPERATIVE ASSOCIATION BANK

S. 3743 (Magnuson) introduced in Senate Aug. 18, 1966. It would, primarily, provide credit facilities for fishermen's cooperative associations by establishing a Bank for Fishermen's Cooperative Association; to Committee on Commerce. Sen. Magnuson said that present provisions of the fisheries loan fund regulations are of only limited value in assisting the financial operation of fishery cooperatives. Similar to H. R. 8922.

FISHERY PERMIT FEES

S. 3793 (Kuchel) introduced in Senate Sept. 1, 1966. Purpose: to authorize Secretary of the Interior to reimburse part of certain fishery permit fees paid to foreign countries by U.S. fishermen; to Committee on Commerce.

Sen. Kuchel (Congressional Record, Sept. 1, 1966, pp. 20642-20643) stated he proposed this following consultation with representatives of fishing industry. Would authorize Interior Secretary to reimburse citizens of United States for part of fishery permit fees they paid any foreign country during employment of American vessels in a traditional fishery of the United States. The cost of this payment would be financed from gross receipts of custom duties collected on fish and fisheries products entering the United States.

FISHING LIMIT OF 12 MILES

H. R. 17046 (Rep. Hansen of Wash.) introduced it in House, Aug. 15, 1966, to establish fishing zones of the United States beyond its territorial seas, and for other purposes; to Committee on Merchant Marine and Fisheries.

Sen Magnuson spoke in Senate (Congressional Record, Aug. 29, 1966, pp. 20245-20247), on need for 12-mile fishery zone. He has asked Departments of State and Interior to reexamine their positions of last May in light of new realities. He stated that the 12-

mile fishery legislation is late--but it can still be in time to save thousands of tons of valuable marine resources and to reserve 12,000 square miles of potential fishery area as part of our American heritage.

Rep. Pelly spoke in House (Congressional Record, Aug. 30, 1966, p. 20408), on Associated Press dispatch indicating Korean Government wanted to establish fishing rights before entering into agreements with other nations (including United States, Canada, Japan). He said 49 nations have established 12-mile fishery jurisdictions. Only 15 nations, including the U. S., still claim 3 miles. Ten nations claim more than 3 but less than 12--and 17 nations, including Korea, claim more than 12. Pelly said 12-mile fishery zone is needed to protect our coastal fisheries and give American fishermen some protection against foreign fishing vessels. He predicted a 12-mile fishing zone bill will be reported favorably by House Committee on Merchant Marine and Fisheries.

In Senate, Sept. 6, Sen. Magnuson spoke on objections by segments of American fishing industry that 12-mile bill before Congress will adversely affect present relations with South American nations off whose shores they presently fish. He said that taking a strong position in behalf of America's fishermen by reserving this additional 9-mile protective and conservation zone will assist immeasurably in our international negotiations on fisheries questions.

FISH PROTEIN CONCENTRATE PLANTS

H. R. 16619 (Downing) July 28, to authorize Secretary of the Interior to develop, through experiment and demonstration plants, practicable and economic means for production by commercial fishing industry of fish protein concentrate; to Committee on Merchant Marine and Fisheries.

The Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries held hearing Aug. 16, 1966, on H. R. 12269, and related bills, regarding fish protein concentrate (FPC). D. L. McKernan, Director, BCF, testified. Said FPC can prove to be a valuable and practicable means of supplementing our foreign policy; of increasing protein intake of our citizens and improving the overall health of our Nation; and of fostering growth of our fish industry. He stated this bill is similar to Senate-passed S. 2720.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries met in executive session Aug. 30, 1966, and continued consideration of H. R. 12269, and related bills.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries met in executive session Aug. 31, 1966, and approved for full committee action S. 2720 (amended).

FOREIGN FISHING OFF U. S. COASTS

Sen. Morse spoke in Senate, Congressional Record, Aug. 16, 1966 (pp. 18694-18696), an article in July 20 Portland Oregonian concerning the boarding of two Soviet fishing vessels off Washington State by Coast Guard. The text is printed in Record.

FUR SEAL CONSERVATION AND PRIBILOF ISLANDS ADMINISTRATION

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries held hearing Aug. 24, 1966, on H. R. 9602 and S. 2102. Purpose of bills: to protect and conserve North Pacific fur seals and to administer Pribilof Islands for conservation of fur seals and other wildlife.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries met in executive session Aug. 30, 1966--considered but deferred action on H. R. 9602, and related bills.

GATT TRADE NEGOTIATIONS

Rep. Curtis spoke in House on Kennedy Round of trade negotiations now in progress under General Agreement on Tariffs and Trade (GATT) in Geneva.

JELLYFISH-CONTROL ELIMINATION IN COASTAL WATERS OF U. S.

S. 3744 (Brewster) introduced in Senate Aug. 18, 1966, to provide for control or elimination of jellyfish and other such pests in coastal waters to Committee on Commerce. Sen. Brewster noted in Congressional Record, Aug. 18, 1966 (p. 18937), that this is companion bill to H. R. 11475.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries met in executive session Aug. 25, 1966, and approved for full committee action H. R. 11475 (amended).

METRIC SYSTEM STUDY

House Committee on Rules, Aug. 25, 1966, denied a rule on S. 774. This authorizes Secretary of Commerce to make a study to determine advantages and disadvantages of increased use of the metric system in the United States.

H. Res. 998 (Miller) introduced in House Aug. 31, 1966. Resolution provides for consideration of S. 774.

MINIMUM WAGE

Hearing before Committee on Rules, House of Representatives, on H. R. 13712. This is a bill to amend Fair Labor Standards Act of 1938 to extend protection to additional employees, raise minimum wage, etc. Part III, Apr. 26, 1966, 75 pp., printed. Contents include statement by congressman and discussion by committee members.

S. Rept. 1487, Fair Labor Standards Amendments of 1966 (Aug. 23, 1966, report from Committee on Labor and Public Welfare, U. S. Senate, to accompany H. R. 13712), 80 pp., printed. Committee reported favorably with an amendment. Discusses background, purpose, major provisions, section-by-section analysis, and changes in existing law.

Senate Committee on Labor and Public Welfare in executive session, ordered favorably reported, with an amendment in the nature of a substitute, H. R. 13712.

Senate Aug. 26, 1966, passed H. R. 13712, to amend Fair Labor Standards Act of 1938. The Senate rejected Amendment No. 771 by Sen. Thurmond, which would add to existing exemptions individuals in shelling of shellfish such as oysters and crabs.

House Aug. 30, 1966, disagreed with Senate amendments to H. R. 13712, agreed to conference with Senate; appointed conferees.

Conferees met in executive session Aug. 31, 1966, to resolve differences between the Senate- and House-passed versions of H. R. 13712.

Conferees in executive session Sept. 1, 1966, agreed to file conference report on differences between Senate- and House-passed versions of H. R. 13712.

OCEANOGRAPHY

Rep. Rogers spoke in House (Congressional Record, Aug. 18, 1966, p. 19040) on remarks of Vice President Humphrey, Aug. 17, as Chairman of the National Council on Marine Resources and Engineering Development. The Vice President stated he plans to visit all of the Nation's oceanographic centers.

Sen. Jackson inserted in Congressional Record, Aug. 25, 1966 (pp. 19705-19706), article from July 30, 1966, issue of the Marin magazine describing progress by Geological Survey and Bureau of Mines in establishing the foundation for future marine mining industry.

Rep. Sickles spoke in the House (Congressional Record, Aug. 30, 1966, pp. 20430-20431), concerning oceanography. Said that since 1959, with release of the National Academy of Science's key report, "Oceanography 1960 to 1970," Congress has been keenly interested. He hopes there will soon be new and amazing breakthroughs in this science.

OIL POLLUTION OF THE SEA

Senate Aug. 17, 1966, reported (S. Rept. 1479) on H. R. 8760, to implement provisions of International Convention for the Prevention of the Pollution of the Sea by Oil.

Senate Aug. 19, 1966, passed without amendment and cleared for President H. R. 8760.

RESEARCH CONTRACTS

The Senate Committee on Interior and Insular Affairs in executive session Aug. 23, 1966, ordered favorably reported with amendment S. 3460, a bill to authorize Secretary of the Interior to enter into contracts for scientific and technological research.

Committee on Interior and Insular Affairs, Aug. 25, 1966, reported (S. Rept. 1523), with amendments, on S. 3460.

Senate Aug. 29, 1966, passed with amendment, S. 3460. The text printed in Congressional Record, Aug. 29, 1966 (pp. 20160-20161), with excerpt from committee report (No. 1523) explaining purposes.

SEA GRANT COLLEGES

Hearing before subcommittee on Oceanography of House Committee on Merchant Marine and Fisheries, June 13, 1966, on H. R. 15192, H. R. 15471, and H. R. 15569. These

are bills to amend title II of Merchant Marine Act, 1936, to authorize establishment and operation of Sea Grant Colleges and certain education, training, and research programs.

House Committee on Rules, Aug. 23, granted an open rule with 1 hour of debate on H. R. 16559.

House Aug. 24, 1966, reported (H. Rept. 1881), H. Res. 982, a resolution providing for consideration of H. R. 16559.

Extending his remarks, Rep. Wydler inserted in Congressional Record, Sept. 8, 1966 (p. A4713), editorial of WHLI (a radio station on Long Island) on Sea Grant College bill (H. R. 16559).

WATER POLLUTION CONTROL ACT

Introduced in House H. R. 17067 (O'Neill of Mass.) Aug. 15, 1966, H. R. 17082 (Cahill) Aug. 16, and H. R. 17369 (Horton) Aug. 26, to amend the Federal Water Pollution Control Act in order to improve and make more effective certain programs pursuant to such act; to Committee on Public Works.

House Committee on Public Works met in executive session Aug. 18, 1966, and ordered reported favorably to the House H. R. 16070 (amended).

WATER RESOURCE PROPOSALS--
FEASIBILITY INVESTIGATIONS

Conferees met in executive session Aug. 15, 1966, to resolve differences between the Senate- and House-passed versions of S. 3034. This authorizes feasibility studies of certain water resource development proposals. No final agreement. To meet again Aug. 16.

Committee on Conference, Aug. 23, 1966, filed a conference report (H. Rept. 1865) on S. 3034, printed in Congressional Record, Aug. 23, 1966 (pp. 19473-19476), with House managers' explanation of significant differences between the two Houses.

House, Aug. 24, 1966, adopted the conference report on S. 3034.

Sept. 7, 1966, the President signed into law S. 3034 (P. L. 89-561).

WORLD HUNGER

Senate Committee on Agriculture and Forestry in executive session Aug. 24, 1966, or-

dered favorably reported, with amendment in the nature of substitute bill, H. R. 14929. Bill is designed to promote international trade in agricultural commodities--to combat hunger and further economic development. As approved by committee, bill would authorize \$1.9 billion for each of calendar years 1967 and 1968 for sales in foreign currency, and \$600 million for each year for donations.

Committee on Agriculture and Forestry, Aug. 25, 1966, reported (S. Rept. 1527, with amendment, on H. R. 14929.

Senate, Aug. 26, 1966, began consideration of H. R. 14929. Text of bill reported by Committee on Agriculture and Forestry printed in Congressional Record, Aug. 26, 1966 (pp. 19995-19999). As reported by Senate, bill will be cited as Food for Peace Act rather than Food for Freedom Act. It includes fishery products under definition of agricultural commodities.

Senate, Aug. 29, 1966, continued consideration of H. R. 14929, the proposed Food for Peace Act of 1966. Sen. Bartlett spoke in Senate, Congressional Record, Aug. 29, 1966

(pp. 20242-20244), expressing satisfaction that fish is included.

Senate, Aug. 31, 1966, passed after adoption of committee amendment (in the nature of a substitute as amended) H. R. 14929, proposed Food for Peace Act of 1966. Senate insisted on its amendments to the bill; asked for conference with House and appointed conferees.

House, Sept. 8, 1966, disagreed with Senate amendments to H. R. 14929, agreed to a conference, and appointed conferees.

REPORT ON FISHERY ACTIONS IN 89TH CONGRESS

The U. S. Department of the Interior's Bureau of Commercial Fisheries has prepared a leaflet on status of most legislation of interest to commercial fisheries at the end of 1st session, 89th Congress. For copies of MNL-3, "Legislative Actions Affecting Commercial Fisheries, 89th Congress, 1st Session 1965," write to Fishery Market News Service, Bureau of Commercial Fisheries, 1815 N. Fort Myer Drive, Rm. 510, Arlington, Va. 22209.



MECHANICAL FISH TO AID OCEANOGRAPHERS

A mechanical fish, designed for taking deep-water samples by oceangoing vessels while underway, has been developed by the Instrumentation Center of the U. S. Naval Oceanographic Office, Suitland, Md. The apparatus is devised especially for use by commercial ships employed to collect oceanographic data without interference to their normal activities.

In operation, the mechanical fish will be dropped over the side of a moving ship in a manner permitting it to attain great depth. As the vehicle falls, a temperature depth record will automatically be plotted on the deck via a standard low-cost steel cable. On the way up, the fish can be activated to gather a sample at any given point.

The sampling device contains a plastic bottle, of about two-quart capacity, with spring-loaded ball valves at each end. The valves are held in the open position against spring pressure by a one-fourth watt resistor. Upon receiving an electric impulse along the tow cable, an internal capacitor is discharged through this resistor, breaking it, and releasing the valves. Electronic components consist of temperature and pressure probes, their respective oscillators, and a mixer-line drive amplifier. A resonant-reed relay is used to sense the command signal from the deck thereby activating the sampling device.

FEATURES

WILLAPA OYSTER STUDIES--USE OF THE PASTURE HARROW FOR THE CULTIVATION OF OYSTERS

By Clyde S. Sayce* and Charles C. Larson**

The English pasture harrow is used in oyster cultivation to break apart and scatter clusters of oysters. It is also used to prepare oysters for harvest by loosening them from the substrate and removing fouling growth. An area of the Long Island Oyster Reserve, Willapa Bay, Wash., was divided into a control and three lanes to test the effect of the harrow upon Pacific oysters (*Crassostrea gigas*). The control was undragged, lane 1 was dragged once, lane 2 ten times, and lane 3 three times. Condition of samples of oysters was determined for each lane every week during dragging and once each month for 6 months after completion of the experiment. The experiment showed that Pacific oysters spawned shortly after being dragged while undragged oysters spawned later. Total mortality of oysters dragged 10 times was no higher than that of oysters dragged once only. Dragging oysters once and 3 times increased Pacific oyster spatfall 3 and 5 times, respectively, but dragging more than 3 times did not increase spatfall further.

INTRODUCTION

Farm harrows, both disc and tooth, modified plows, and oyster and clam dredges have been used in Long Island Sound, New York, to aid the cultivation of oysters by burying oyster drills. In the gradual mechanization of the oyster industry of Willapa Bay, Wash., straight-tooth drags, spring-tooth harrows, and tractor harrows were tried and discarded while the pasture harrow has been used most successfully in cultivation of Pacific oysters (*Crassostrea gigas*).

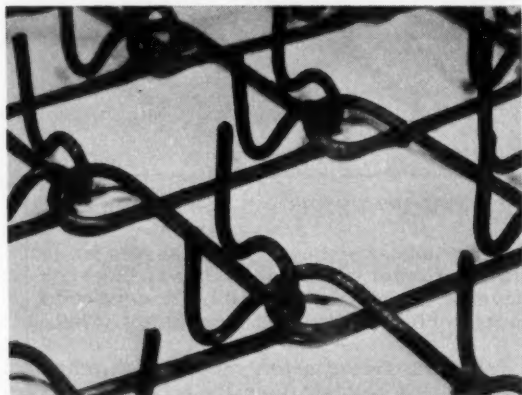


Fig. 1 - Detail of the linkage of teeth of the English pasture harrow.
(Photo by C. S. Sayce)

The commercially available English pasture harrow is used by farmers to break up dirt clods in pasture leveling. This harrow is formed of triangular-shaped linkages with a 4-inch long tooth at the base of each leg. The legs are about 8 inches long and adjacent links are held together by a loop at the apex of the triangle and rings at each leg. This arrangement gives a loose linkage of triangles made of $\frac{7}{16}$ -inch diameter rod with 4-inch teeth spaced 4 to 6 inches apart; rows are 6 to 7 inches apart (fig. 1). The toothed harrow section is 10 feet wide and 6 feet long, has a total length of 10 feet, including weights and towing bar, and has a total weight of about 250 pounds. (Fig. 2).

The first use of this harrow in Willapa Bay was to break apart clusters of growing

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oysters and scatter them more evenly over the ground. The cultivation was during the second summer after planting of seed, and during the following year if oyster growth and thickness of the planting appeared to warrant it. This procedure has virtually eliminated breaking and scattering by hand during low tide and has saved the grower considerable expense. The harrow is dragged from an "A" frame mounted on either an oyster scow or a tow boat and raised and lowered by winch, powered or unpowered. Only one person, the boat operator, is usually needed for either arrangement, since the harrow may be dragged continuously except when beds are heavily covered with eel grass or moss. At such times, an additional man is needed to raise the harrow frequently for cleaning (fig. 3).

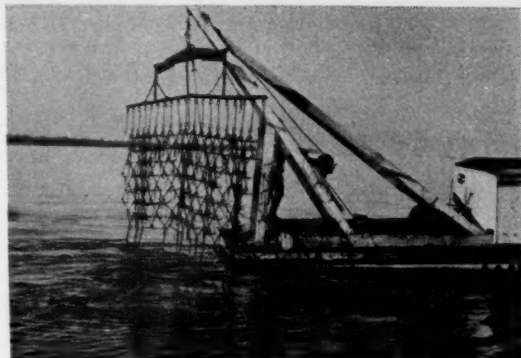


Fig. 2 - A two-section English pasture harrow hanging from an "A" frame on a 10- by 30-foot oyster barge. (Photo by C. S. Sayce)



Fig. 3 - A single-section English pasture harrow suspended from a dredge boom showing eel grass dragged from an oyster bed. (Photo by C. S. Sayce)

Two methods of dragging permit complete coverage of an oyster bed without excessive dragging over some parts and none over others. One method is to circle the bed continuously, reducing the radius one width of the harrow at each circuit. The other is to begin at one corner and drag forth and back along the oyster bed moving over one harrow width each time. This system of dragging requires a small, tight turning circle at the end of the oyster bed or off the end (if space is available) or lifting the harrow at the end of each crossing. This disadvantage, as compared with continuously circling the oyster bed, is compensated by the advantage of more precise control of the amount of harrowing any given portion receives; additionally, it is easy to harrow on a line perpendicular to the first one. The ground type, its position in

reference to prevailing winds and tides, and amount of harrowing needed should be considered when a decision is made about the procedure.

Oysters that are partially buried may be pulled out of the ground to the surface without excessive damage to them. This action is desirable to raise buried oysters following storms or just prior to harvest to loosen them in preparation for pickup by an oyster dredge. In action, the harrow digs out and tumbles oysters cleaning them of mud and fouling organisms. It is used, therefore, to clean shell cultch just before an impending spatfall.

OBJECTIVE

Use of the harrow in oyster farming has increased during the past few years, but its effect upon oysters has not been investigated. This paper describes an experiment in Willapa Bay, Wash., conducted between July 8, 1964 and March 13, 1965, by the staff of the Washington Department of Fisheries, Willapa Bay Shellfish Laboratory, to evaluate the use of the pasture harrow upon Pacific oysters.

METHODS

A natural bed on Long Island State Oyster Reserve in southern Willapa Bay was chosen for this experiment (fig. 4). The ground, composed of a mixture of soft mud and old, native



Fig. 4 - A view looking north at the Cultivation Experiment 1 tract on Long Island State Oyster Reserve in southern Willapa Bay, Wash. (Photo by C. S. Sayce)

oyster shell, appeared to be more firm in the area where Pacific oysters were concentrated. The oysters were old (5+ years), clustered, and partially buried. The tract was laid out in four rectangular lanes 65 by 200 feet with the length running parallel to the reserve line from monument 68 to 69 in a northwest-southeast direction. The plots were designated control lane, lane 1, lane 2, and lane 3 (fig. 5), and surveys of each lane were made before, during, and after dragging. About 25 percent of the area had an eel grass cover; the growth was heaviest in the control lane and lane 3.

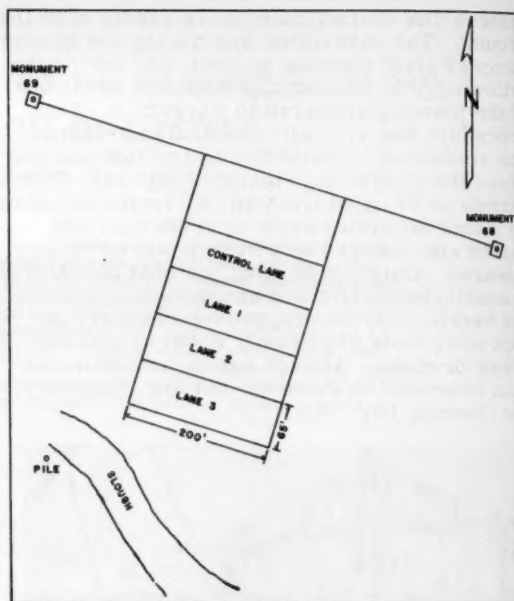


Fig. 5 - Arrangement of lanes for Cultivation Experiment 1.

Table 1 - Mean Number of Live Oysters, Loose Shells, and Clusters Per Square Yard for All Lanes of Cultivation Experiment 1

Date	Lane	Square Yard Sampled	Mean Live Oysters Per Yard ²	Mean Number of Shells Per Yard ²	Mean Number of Clusters Per Yard ²
1964 July 23	1	22	19.3	15.4	3.0
	2	22	12.8	9.3	3.9
	3	19	8.2	12.2	1.0
August 7	Control	21	14.9	24.8	2.5
August 6	2	24	18.2	19.0	3.0
October 3	1	4	21.5	12.2	4.2
	2	6	12.3	13.0	0.8
	3	3	51.0	43.0	8.7
1965 March 13	1	10	9.1	34.3	2.5
	2	10	17.6	24.2	1.2
	3	10	7.8	13.0	0.2
	Control	10	8.4	22.2	2.4

A square-yard frame was used to sample areas at regular intervals along a diagonal line bisecting each lane. Within the square-yard sample area, all live and dead oysters, number of clusters, oysters per cluster, and loose (single) shells were counted (fig. 6, table 1). Gaping oysters were counted as dead, and special note was made of dead oysters which had broken or punctured shells (fig. 7). Records of temperature, salinity, and turbidity of the water were tabulated during the experiment and counts of oyster larvae were taken in the overlying waters during the spawning and setting season. Following completion of dragging and after the spatfall, shell samples from each lane were checked to determine the effect of dragging upon the setting of Pacific oysters. The experiment began with a predragging survey of all lanes.



Fig. 6 - The square-yard sampler used for making a systematic count of live and dead oysters, amount of shell, and number of clusters. The line of cedar stakes indicates locations to be surveyed. (Photo by C. C. Lanson)

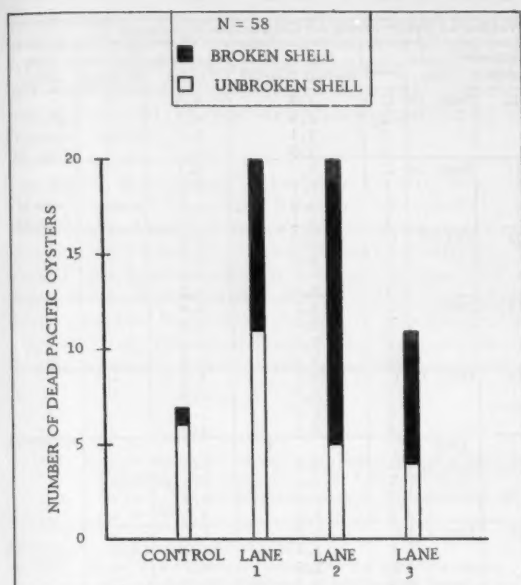


Fig. 7 - Pacific oyster mortalities from all lanes of Cultivation Experiment 1 separated into broken-shell and unbroken-shell categories.

The first survey and collection of samples for determination of oyster condition was on July 8, 1964. Experimental harrowing began July 23 when each of the lanes 1, 2, and 3 was dragged once. The control lane was never dragged, lane 1 was dragged only once, lane 2 was dragged once each week for 10 weeks, and lane 3 was dragged during the beginning, middle and last week (total of 3 times). A sample of 20 oysters was taken weekly from each lane immediately before the dragging and, after completion of experimental dragging, monthly for 6 months until March 1, 1965 (table 2). Dragging produced some changes in the condition of oysters.

Condition of oysters^{1/} in all lanes was similar before dragging, ranging from 7.2 in lane 3 to 8.0 in the control lane. The condition of control-lane oysters (9.4) on August 6 indicated ripe, ready to spawn oysters; condition then immediately dropped to a very low value (3.8) on August 11 after spawning. Recovery was rapid but erratic and at the end of the sampling period (March 1, 1965), control-lane oysters had the lowest condition (3.9) while all dragged lanes had an identical but higher value (5.1).

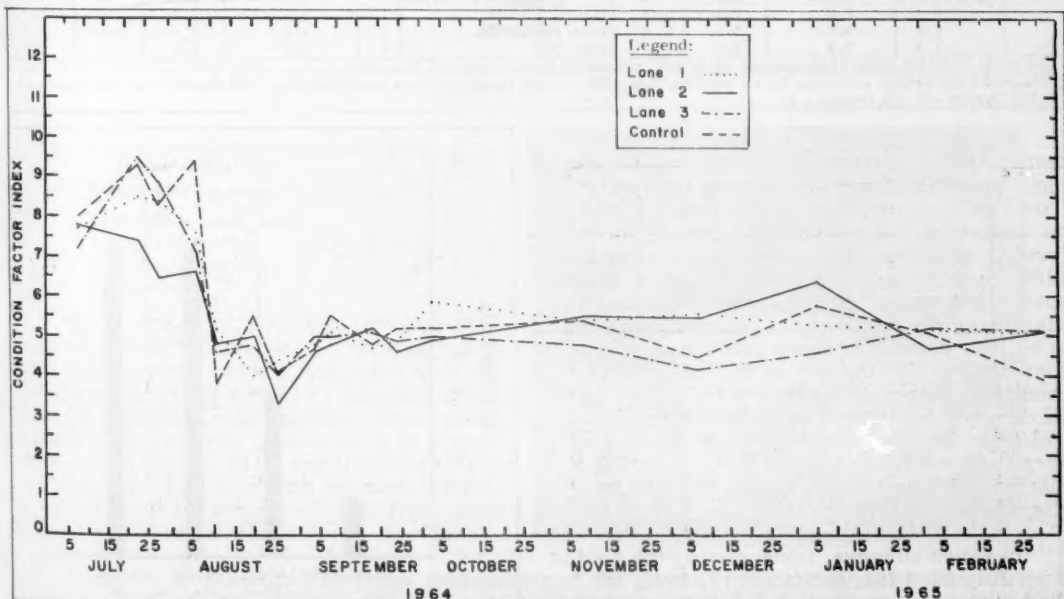


Fig. 8 - Condition indices of Pacific oysters for all lanes of Cultivation Experiment 1 from July 8, 1964, to March 1, 1965.

^{1/}Classification of Pacific oysters in Willapa Bay according to condition index is as follows: Below 4.0, extremely poor quality; 4.0 to 8.0, poor quality; 8.0 to 12.0, good quality; above 12.0, excellent quality.

Table 2 - Dragging Schedule, Condition Indices, and Dry Weights of Oyster Meats for Cultivation Experiment 1.

Sample Number	Sample Date	Lane	Dry Meat Weight Grams ¹	Condition Index	Number of Drags	Drag Date	Sample Number	Sample Date	Lane	Dry Meat Weight Grams ¹	Condition Index	Number of Drags	Drag Date
1	1964 July 8	C	4.4	8.0	0	-	10	Sept. 18	C	3.0	4.8	0	July 23 Sept. 17 Aug. 20
		1	4.2	7.7	0	-			1	2.6	4.7	1	
		2	4.4	7.8	0	-			2	3.1	5.2	9	
		3	4.5	7.2	0	-			3	3.0	5.1	2	
2	July 23	C	5.2	9.3	0	-	11	Sept. 24	C	3.0	5.2	0	July 23 Sept. 24 Sept. 24
		1	5.5	8.5	1	July 23			1	3.1	4.9	1	
		2	4.1	7.4	1	July 23			2	3.0	4.6	10	
		3	4.9	9.5	1	July 23			3	3.1	4.9	3	
3	July 28	C	5.4	8.3	0	-	12	Oct. 4	C	3.0	5.2	-	-
		1	5.2	8.4	1	July 23			1	3.6	5.9	-	
		2	4.4	6.5	2	July 30			2	3.1	4.9	-	
		3	5.3	8.9	1	July 23			3	3.1	5.0	-	
4	Aug. 6	C	6.3	9.4	0	-	13	Nov. 9	C	3.2	5.4	-	-
		1	4.4	7.6	1	July 23			1	3.2	5.4	-	
		2	3.9	6.6	3	Aug. 6			2	3.3	5.5	-	
		3	4.5	7.1	1	July 23			3	3.2	4.8	-	
5	Aug. 11	C	2.5	3.8	0	-	14	Dec. 7	C	3.1	4.5	-	-
		1	2.8	5.2	1	July 23			1	2.9	5.6	-	
		2	2.9	4.8	4	Aug. 13			2	2.8	5.5	-	
		3	2.7	4.6	1	July 23			3	3.3	4.2	-	
6	Aug. 20	C	3.2	5.5	0	-	15	1965 Jan. 5	C	3.2	5.8	-	-
		1	2.2	4.0	1	July 23			1	3.2	5.3	-	
		2	2.8	5.0	5	Aug. 20			2	3.2	6.4	-	
		3	3.3	4.8	2	Aug. 20			3	2.6	4.6	-	
7	Aug. 26	C	2.6	4.1	0	-	16	Feb. 2	C	3.0	5.1	-	-
		1	2.7	4.4	1	July 23			1	3.2	5.2	-	
		2	2.7	3.3	6	Aug. 27			2	2.5	4.7	-	
		3	2.6	4.0	2	Aug. 20			3	3.2	5.2	-	
8	Sept. 4	C	2.9	4.7	0	-	17	March 1	C	2.3	3.9	-	-
		1	2.9	4.8	1	July 23			1	3.3	5.1	-	
		2	2.7	4.6	7	Sept. 3			2	2.9	5.1	-	
		3	3.0	5.0	2	Aug. 20			3	3.1	5.1	-	
9	Sept. 8	C	2.7	5.5	0	-	Mean per oyster		C	3.52	5.8	-	-
		1	2.6	5.1	1	July 23			1	3.4	5.8	-	
		2	3.0	4.8	8	Sept. 10			2	3.2	5.4	-	
		3	2.8	5.0	2	Aug. 20			3	3.4	5.6	-	

¹/Dry meat weight is given as an average per oyster calculated from samples of 20 oysters.

²/The mean dry weights per oyster for all samples, July 1964 through March 1965 are calculated for: 339 Oysters - C; 339 Oysters - 1; 335 Oysters - 2; 338 Oysters - 3.

In lane 2 (dragged 10 times) the physical disturbance of oysters produced mass spawning. The condition index declined steadily from the beginning high of 7.8 to a low of 3.3 on August 26, but recovered to the highest level of condition shown (6.4) on January 5, 1965. Lanes 1 and 3 showed effects of partial spawning and then of more spawning after initial dragging; recovery of oysters appeared to be less erratic in these lanes than in the control lane. At the end of the experiment, condition indices of oysters were higher in all dragged lanes than in the undragged control lane; dragging of oysters 10 times, however, was not more beneficial to their condition than less frequent dragging (fig. 8). Dragging did not materially increase mortality.

In seven surveys, taken during the period from July 23, 1964, to March 13, 1965, 58 dead oysters were recorded in two categories, broken shell and other. In the control lane 7 (12 percent) were dead, one of which had a broken shell; in lane 2, dragged 10 times, 19

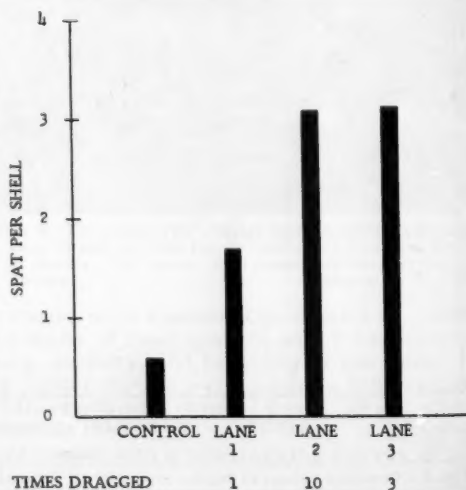


Fig. 9 - Counts of Pacific oyster spat per shell from the 1964 spat-fall in all lanes of Cultivation Experiment 1.

(33 percent) were dead, of which 15 (26 percent) were broken; and in lane 3, dragged 3 times, 11 (19 percent) were dead, of which 7 (12 percent) were broken. It can be concluded that limited dragging caused negligible mortality, but a threefold increase in dragging caused nearly a fivefold increase in mortality. Deaths (31) caused by dragging, however, represented only 53 percent of the total (58) and were not significantly high (fig. 7). The 1964 spatfall was improved in the dragged lanes.

Since harrowing to remove fouling organisms from old oysters and shell would be an expensive way to prepare ground for spatfall, shell samples were taken from each lane after the 1964 setting season to determine setting according to the amount of dragging. The control-lane shell had the lowest count (0.6 spat per shell). Lane 2 (dragged 10 times) and lane 3 (dragged 3 times) had spat counts of 3.1 and 3.2 spat per shell, respectively, about 5 times greater than the spatfall on control-lane shell. Lane 1 (dragged only once) had 1.7 spat per shell—nearly 3 times greater than the spatfall in the control lane (fig. 9). These records indicate that dragging only once improved setting of Pacific oysters on old shell and dragging them 3 times greatly improved spatfall, but that dragging them more than 3 times did not further improve spatfall.

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JIFFY FILLETS

2 pounds rockfish fillets or other fish fillets,
fresh or frozen

$\frac{1}{4}$ cup melted fat or oil

2 tablespoons lemon juice

1 teaspoon salt

Dash white pepper

Paprika

Thaw frozen fillets. Cut into serving-size portions. Combine fat, lemon juice, salt, and pepper. Place fish, skin side up, on a well-greased broiler pan and brush with fat. Sprinkle with paprika. Broil about 3 inches from source of heat for 4 to 5 minutes. Turn carefully and brush with remaining fat. Sprinkle with paprika. Broil 4 to 5 minutes longer or until fish flakes easily when tested with a fork. Serves 6.



This recipe developed by home economists of the Bureau of Commercial Fisheries is from a 19-page, full-color, cookery booklet (*Top O' the Mornin' with Fish and Shellfish*, Test Kitchen Series No. 15) recently released by the Bureau of Commercial Fisheries, U. S. Department of the Interior. For 25 cents you can buy a copy from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

ESTUARIES: A NEGLECTED RESOURCE COMPLEX

By Dr. Stanley A. Cain*

You are familiar with our estuaries--where fresh and salt water intermingle--and you know that they have been largely neglected. This is attested by your efforts to preserve some of them in a natural state. I wish, therefore, to emphasize the other words of the title, that estuaries are natural resource complexes. The key word is "complex."

In general we have tended to think of natural resources as single entities: coal, petroleum, copper ore; air, water, and soil; crop plant and livestock varieties; ducks, deer, bass and other fish and wildlife species; lumber, paper pulp, and other forest products; land as open space, building lots, and sites for roads and airports.

We know that things, conditions, and natural processes in the environment are counted as resources when we have the capability of turning them to human use or meaning.

We are only beginning to learn that our taking from nature, gradually or suddenly, affects nature more than by simple subtraction, and that the byproducts and wastes of our actions, when added to the environment, do something more than simple addition.

Long before man's arrival on this earth, the elements of nature were in constant interaction. This interaction continues, but on a distorted basis, for man has entered the picture. He adds here, subtracts there. He diverts, changes, improves, destroys. Individually, a man's effect on nature's rhythm

may be minor. Collectively, however, it can and often is catastrophic.

Let us look at these facts:

- ... Resources interact with nature
- ... Men can and do use resources in widely different ways
- ... Resources are extremely complex, existing in mixtures and blends

Man, individually and collectively, changes an ingredient here, alters a cycle there--and it is clear that the concoction he has cooked up is far different from what nature would be otherwise. The result often becomes unpalatable--in fact sometimes downright poisonous--to him and certainly to nature.

The interference with the complexities of nature can be illustrated by considering our forest, grasslands, and deserts; our oceans, lakes, and streams.

Remarkable World of Estuaries

And estuaries are outstanding examples of such complexes. Here the fresh waters of streams meet the salt waters of the sea, bound on the landward side by the limit of tidal and wave influences and seaward by offshore bars and open ocean. Everywhere within, it is a maze of stream and tidal channels, bottoms of peat and muck, silt and sand, and patches, islands, and peninsulas of marsh and salt-tolerant brush.

Estuaries are a happy land, rich in the nutrients of the continent itself, stirred by the forces of nature like the soup of a French chef; the home of myriad forms of life from bacteria and protozoans to grasses and mammals; the nursery, resting place, and refuge of countless species whose urges cause them to migrate or to seek varying habitats for youth, maturity, and old age.

And estuaries are an unhappy land because of pollution, dredging, and filling, and all



Dr. Stanley A. Cain

*Assistant Secretary of the Interior for Fish and Wildlife and Parks.
Remarks at Annual Meeting of the Salt Pond Areas Bird Sanctuary Inc., Falmouth, Mass., August 11, 1966.



Fig. 1 - An estuary in Florida's Everglades National Park. (Photo by M. Woodbridge Williams, National Park Service)

of the things that man does to alter and destroy them.

Every day there are more of us with concern for the quality of the environment and the way that we manage our natural resources. We have been labeled. We are the "conservationists." It is a good label in many ways, but it is not a precise one because of the very complexities I have mentioned and because conservation has become a movement.

Like most popular movements, conservation has had its slogan makers. James Bryant Conant, when President of Harvard University, said in a baccalaureate address in 1934:

"Slogans are both exciting and comforting, but they are powerful opiates for the conscience. . . . Some of mankind's most terrible misdeeds have been committed under the spell of certain magic words or phrases."

In the resources field, "multiple use" has become one such rallying cry. Only a few

months ago the President of a State Chamber of Commerce, in arguing against a suggestion that polluters be taxed, said that pollution of a stream was one of its multiple uses.

Definitions in the conservation field, as in other movements, become catch-words that do not really define but only express general and pious notions. One of the oldest goes like this: Conservation is the use and management of natural resources for the greatest good of the most people over the longest time. This is frequently abridged to: Conservation is the wise use of natural resources.

There is an easily recognized good intention in the language of these definitions. The meaning does not have to withstand economic or political analysis as long as a problem remains generalized. One does not, as a conservationist, have to determine what is the "greatest good" in terms of alternate "goods" or of various possible combinations of consequences of actions that may be more or less "good." One does not have to decide whether what is deemed "good" by most people does in fact produce a social cost for all people, a

personal loss for some people, or a combination. A concern for the future, which is having something "good" over the longest time, does not necessarily help solve an immediate problem. All such questions remain open, as they do when we say that conservation is wise use of natural resources, because the slogan does not tell us what wisdom is.

There is an element of utopianism in conservation at the slogan level and I think in actuality.

Our awakened devotion to natural beauty and a society's greatness has Olympian aspects. That the gods differed on Olympus is not entirely beside the point!

As soon as we move from Olympian words and sloganeering words to action, when we move from being conservationists to being conservators, we enter a more complex and difficult world where good will is not enough and where there are "good will" on a conflict course. And we move from philosophic heights to dollar-and-cents facts. And the

dollars are not all-out theoretical to your concern for the protection of salt marshes.

Let us look at some of the estuarine values that are being destroyed. A salt marsh in Massachusetts--that is, a healthy one--can produce a harvestable crop of protein-rich seafood worth \$300 an acre annually. This is about equal to the fish farm ponds of the Middle West, and both far exceed the production of the best cattlelands of the western grasslands.

Estuaries Important to Commercial Fishermen

During a recent 10-year period along the North Atlantic coast, commercial finfish landings averaged 1.6 billion pounds, and shellfish landings were 107 million pounds, for a monetary value of about \$90 million. A large percentage of these fisheries depends on estuaries because the species spend at least part of their life in them. This is clear for shellfish and crustacea. It is probably less well known for many species of finfish. Men-



Fig. 2 - Estuaries like this are being destroyed along the coastline of the United States.

haden, sea herring, summer flounder, and whiting spawn offshore and later move to in-shore and estuarine waters. Anadromous fish of the North Atlantic coast such as alewife, American shad, and striped bass move through the estuaries to fresh water to spawn.

Looking at the broader picture, we find that in a recent typical year the seafood landings of the Atlantic coast were 2.2 billion pounds; of the Gulf coast, 1.4 billion; and of the Pacific coast (exclusive of Hawaii), 1.1 billion pounds. The total was 4.7 billion pounds, worth \$362 million.

sume, the impressive point is that about two-thirds of both the catch and the landed value of this seafood is absolutely dependent upon estuaries.

Then there is the sport fishing interest. At present one of my associates in Washington is vacationing on the Atlantic coast. I asked if he was going fishing. The answer was, "night and day."

As long ago as 1960 it was reported that along the Atlantic coast over three million fishermen spent more than one-third billion



Fig. 3 - Jones Beach on Long Island is part of area threatened by industry, booming population, and pollution.
(Photo by Jones Beach State Park Commission.)

This is not impressive for a nation with a gross national product of more than \$700 billion, and it is not close to the domestic raw materials values of forest products, minerals, and agriculture. It does not state the value added to round-fish by processing, packing, and marketing. But considering our need for protein-rich foods and the fact that we import about two-thirds of what we con-

dollars on this type recreation. Considering the many other personal uses and pleasures of estuarine complexes, including waterfowl hunting, bird watching, and other forms of enjoyment of nature and beauty, and swimming, boating, and water-skiing in some cases, one wonders where the idea came from that estuaries are wastelands in need of "development."

That "development" is going forward rapidly is a fact we all know. That this development is beneficial to some individuals is also apparent. The real estate salesman and developer make a short-term profit. The firm that places a factory, a marina, or an oil refinery on filled estuarine land benefits. And so does the resident homeowner there, or the family with a vacation cottage. But these latter ones who came to the estuaries because they found them attractive, and whose single, filled building lot did no great damage, begin to suffer when shoulder-to-shoulder cottages form a seaside slum, when the industrial complexes pollute the water, and when the accumulated dredging and filling destroys the estuary itself. The costs and benefits of the long-run are quite a different matter from the initial short-term benefit. Only the real estate man and the developer appear to suffer no loss as they move from one transaction to the next. But the people are beginning to appreciate the costs and consequences of unplanned and unregulated development of estuaries.

Some States Act to Save Estuaries

Several recent actions by northeastern states are encouraging. You know them better than I, but I will mention some of them briefly.

Several towns in Massachusetts have passed laws prohibiting any use of marshland for building sites or other purposes which would destroy its biological and scenic values. The Commonwealth enacted a law in 1963 regulating the dredging and filling of certain areas bordering on coastal waters, and in 1965 the Coastal Wetlands Preservation Bill was passed in an effort to afford permanent protection to salt marshes.

New York amended its conservation law in 1959 to provide for state assistance in preserving town and county wetlands, and to give the Conservation Department power to issue permits to dredge and fill in navigable waters, except, unfortunately, for tidal waters of Nassau and Suffolk Counties.



Fig. 4 - Once a waterfowl marsh, it now is crowded with small homes.

Rhode Island's Green Acres program of 1964 and the Marshland Zoning Law of 1965 were designed to reduce the rate of destruction of coastal wetlands.

New Jersey, under its Green Acres program, now owns or leases about 90,000 acres of wetlands.

Not all the protective actions are being taken by towns, counties, and states. There are many bills before Congress. Some seek to help the preservation of specific wetlands and to improve conditions on entire rivers. Another would provide for a nationwide study of coastal wetlands, looking toward a Federal system of preserved estuaries. All these moves are sparked by forward-looking individuals, in and out of government, and are backed by groups of citizen activists and a growing mass of public opinion. Let us cross the continent for a look at one such recent action.

In response to a public need for a democratically constituted, politically responsible body to see that San Francisco Bay and its shoreline were analyzed, planned, and regulated, Senate Bill 309 was passed and approved by Governor Brown of California in July 1965, authorizing the San Francisco Bay Conservation and Development Commission. The Commission consists of representatives of two Federal agencies, five State agencies, nine counties, three representatives of cities, and seven from the public at large. The Commission is charged with studying all aspects of the bay-area problem, including proposed new uses, looking toward the preparation by 1969 of a comprehensive and enforceable plan for the conservation of the water of San Francisco Bay and the development of its shoreline. During the time of the study and preparation of the plan, the Commission is empowered to issue or deny permits, after public hearings, for any proposed project that involves dredging and filling.

The California Legislature found that the uncoordinated and haphazard way in which San Francisco Bay was being filled threatened the welfare of present and future residents. Furthermore, in the absence of such a Commission, there was no mechanism for evaluating the individual projects of cities and counties or of coordinating the actions of the several units of local government. The result was that navigation was being restricted, there was destruction of feeding and breeding

habitat of fish and wildlife, and there were adverse effects on the quality of the water and even on the air.

Role of Corps of Engineers

Let us now look at the U. S. Army Corps of Engineers. The civil functions of the Department of the Army, acting through the Corps of Engineers, include the execution, operation, maintenance, and control of river and harbor and flood-control improvements authorized by law, and the administration of laws for the protection and preservation of navigation and navigable waters of the United States. In its brochure on permits for work in navigable waters, the Corps states clearly that "the decision as to whether a permit will be issued must rest primarily upon the effect of the proposed work on navigation...."

"Whenever the waters of any stream or other body of water are proposed to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever...the District Engineer will coordinate applications for permits to authorize such work with the Regional Director, U. S. Fish and Wildlife Service, and the head of the agency exercising administration over the fish and wildlife resources in the particular state wherein the proposed work will be performed to obtain their views with respect to the prevention of loss and damage to fish and wildlife resources. Should these agencies indicate that the proposed work will be harmful to fish and wildlife, their views will be made known to the applicant and an effort made to reach a compromise solution."

The Corps is not required to do anything about the recommendations of these agencies but consider them and transmit their views to the applicant.

One of the early Federal recognitions of the consequences for certain aquatic natural resource values by construction, such as dams, was a 1934 Act to promote the conservation of wildlife, fish and game. This Act was amended and strengthened in 1946, and further amended in 1958 when it was titled "The Fish and Wildlife Coordination Act." These actions resulted because of the adverse effects on fish and wildlife of the single-purpose water control and development works that were being built in rapid sequence.

Interior's River Basin Studies Help Fish and Wildlife

Under this Act, it has been the responsibility of the River Basin Studies of the Bureau of Sport Fisheries and Wildlife of the Department of the Interior to investigate contemplated projects of the Army Corps of Engineers, the Bureau of Reclamation, and the Federal Power Commission. The River Basin Division advises the Federal agency planning to do the work or to issue a permit or license for such work as to whether there would be adverse effects on fish and wildlife resources and what should be done to avoid or mitigate losses and in some cases how biological resources might be enhanced. These other agencies do not have to follow the advice. They are merely required to consider it. The record may be uneven, but the situation is better than if the Coordination Act did not exist.

The record for the northeastern coast is worth looking at. The Bureau of Sport Fisheries and Wildlife reports each year on about 75 projects of the Corps of Engineers that are concerned with harbor improvement, beach erosion control, channel dredging, anchorages, and so forth. In addition, and probably of equal importance, the Corps issues permits for public and private work, such as building jetties, installing bulkheads, dredging, and filling. The Bureau of Sport Fisheries and Wildlife cooperates with the Bureau of Commercial Fisheries, also in Interior, when anadromous fish are concerned and when works affect estuaries. The states may also cooperate in reviewing proposals.

Between 1962 and 1965, the Bureau of Sport Fisheries and Wildlife reported on 24 dredge and fill projects in the New York City-Long Island area which it thought should be denied in the public interest. However, 16 of them were issued permits. The Bureau recommended that 35 other projects should receive permits only with restrictions designed to prevent or reduce loss to fish and wildlife. Twenty-one of these were issued without any restrictions.

Whereas in New York State only 37 percent of the cases heeded the recommendations, in New England the recommendations to protect fish and wildlife were effective in 70 percent of the cases.

The Northeast Region of the Bureau of Sport Fisheries and Wildlife surveyed the

tidal marshes from Delaware to Maine in 1954, 1959, and again in 1964. During the first five-year period, 23,500 acres of tidal marshes were lost to "progress," and during the last five years the loss was 21,500 acres. About one-third of the lost acreage is from harbor and channel dredging, resulting principally from the deposit of the spoil on valuable marshes. About one-fourth of the lost acreage is from filling for housing. The damage from the latter source is greater than it seems because the fill material generally is obtained from the marshes, usually doubling the acreage destroyed because of the slow recovery of the dredge bottom.

No Federal Authority Over Local Actions

For those concerned about protecting the estuarine natural resource complex, one of the serious questions is the lack of Federal authority over the actions of cities, counties, and states.

For a long time it has been clearly a public necessity that the Federal Government have control of navigable waters, and the Army Corps of Engineers has had such authority, but for navigation only.

Many persons believe that there is public need for controls that would protect other uses of the resources of estuarine complexes. The fact that the deposit of spoil from the Corps' proper harbor and channel dredging works often is destructive to fish and wildlife habitat may not be so much a lack of concern for these natural resources values as it is the Corps' imperative to work as economically as possible. It follows, in the view of many of us, that the benefit-cost calculations that lead to spoil dumping in objectionable places are too narrow. The economic considerations should, I would say must, include all social costs--the cost of those uses impaired and the cost of potential benefits foregone.

It is my view, and I admit a personal bias based on my experiences and understanding, that the Department of the Interior should have equal authority with the Corps of Engineers regarding construction and other works that affect estuaries. The public interest in navigation has long been protected by the Federal Government. We have been tardy in recognizing other estuarine values, including commercial and sport fisheries, wildlife, and natural beauty.

We are now approaching the problem of water quality. The 1965 Act creating the Federal Water Pollution Control Administration is the direct result of a general recognition that connecting waters of streams and their estuarine mouths where they reach the sea cannot be cleaned up and kept clean by the states and local governments.

Dirty water is all-pervasive in its effects on habitat and human uses of estuarine resources, and the pollution control effort is a great step forward, as was the navigation need which resulted in legislation. As I have indicated, estuaries are a resource complex even further in need of governmental attention.

I believe that Interior is the appropriate agency for broad responsibility for the quality of the environment, as has been attested by the transfer this year of the Water Pollution Control Administration to it, for the reason that Interior is becoming generally recognized as the lead agency with responsibility for the use and management of natural resources in the Nation as a whole. Other agencies have, and should continue to have, certain responsibilities for natural resources, but Interior is across-the-board in its responsibilities.

I do not wish to leave you with the impression that the Corps of Engineers is indifferent to values beyond its immediate charge. Many of its achievements stand as models of conservation. Indeed, if it were not for many of these multi-purpose beneficial works we would be beset with more floods, we would be deficient in power-production capability, and the arteries of commerce would be restricted.

What I do wish to impart is this: every passing day sees our resources becoming more vulnerable to the pressures of man and machine. To me, and to countless others who feel they have a responsibility to nature and, in turn, to men of this generation and others to come, progress cannot be counted solely in terms of dollars, a building lot dredged from the bottom of an estuary, or something chopped off here and added there.

We cannot alter the face of the earth with impunity. We must, if we are to endure and enjoy our resources to the utmost, strike a balance with nature. If we do not, we inevitably will degenerate into a has-been nation with an overdrawn account in the bank of beauty and quality.



MANUAL DISTRESS SIGNALING FOR SMALL BOATS

A boatman is never without a daylight distress signal as long as he can use his arms. A small craft operator can indicate to passing vessels or searching aircraft that he is in distress by outstretching his arms to each side slowly raising and lowering them. The use of this manual distress signal by all boatmen is encouraged by the U. S. Coast Guard and was emphasized in a recent press release issued by that agency.

This distinctive signal will not be easily confused with the friendly wave so often used by boatmen as a courteous gesture, the Coast Guard states. The visibility of the signal can be improved by holding in each hand a handkerchief, towel, shirt, or other eye catcher.

Other practical signals for small craft include continuous sounding of the fog horn, flares, smoke signals making orange-colored smoke, and the spoken word "Mayday" over radiotelephone.

INTERNATIONAL

Whale Quotas Set for 1966/67 Antarctic Season

A four-nation conference in Tokyo agreed September 7, 1966, on quotas for the 1966/67 Antarctic whaling season to begin December 1966. Effective for this season only, the total quota was set at 3,500 blue-whale units (BWU)--Japan: 1,633 units or 46.67 percent; U.S.S.R.: 1,067 units or 30.48 percent; Norway: 800 units or 22.85 percent. Great Britain decided not to whale this season but reserved the right to resume in the future.

The 1965/66 quota was 4,500 BWU, but no agreement was reached on a preseason division of the quota. The total catch was 4,089 units: Japan: 2,340 units or 57.2 percent; U.S.S.R.: 920 units or 22.5 percent; and Norway: 829 units or 20.3 percent. (Fisheries Attache, United States Embassy, Tokyo, September 7, 1966, and other sources.)

International Pacific Halibut Commission

AREA 3A CLOSED EARLY

The International Pacific Halibut Commission closed fishing in North Pacific Area 3A on August 15. This area includes waters from Cape Spencer to the Shumagin Islands off Alaska. It was opened May 9, together with Areas 1, 2, and 3B.

The 1966 quota for Area 3A was limited to 33 million pounds, 1 million less than 1965. Because of the larger fishing fleet and lower catch quota, the 1966 season for this area was 20 days shorter than the 1965 season. As of August 11, 1966, United States and Canadian catch was 29 million pounds.

In Area 2, the catch limit of 23 million pounds was reached August 25. As of August 11, 1966, United States and Canadian catch in this area was 20.1 million pounds; in Area 3B, it totaled 1.3 million pounds. The quota for Area 3B is 3.5 million pounds.

Fish Meal Production and Exports, January-May 1966

The member countries of the Fish Meal Exporters' Organization (FEO), which account for about 90 percent of world exports of fish meal, compiled the record below for January-May 1966. The FEO countries are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa.

Table 1 - Exports of Fish Meal by FEO, January-May 1966

Country	May		Jan.-May	
	1966	1965	1966	1965
.. (1,000 Metric Tons) ..				
Chile	12.5	5.7	79.3	46.4
Angola	1/	1.6	2/14.9	21.3
Iceland	8.4	10.6	56.0	42.7
Norway	14.0	13.6	90.5	73.6
Peru	107.5	157.9	626.7	785.8
So. Africa (including S.-W. Africa)	17.6	23.4	54.7	89.8
Total	160.0	212.8	922.1	1,059.6

1/Data not available.

2/Data available only for Jan.-Apr. 1966.

Table 2 - Production of Fish Meal by FEO,
January-May 1966

Country	May		Jan.-May	
	1966	1965	1966	1965
.. (1,000 Metric Tons) ..				
Chile	27.7	3.8	115.8	41.4
Angola	1/	1.7	2/15.8	17.2
Iceland	3.8	7.1	41.5	34.3
Norway	51.8	27.8	175.1	107.0
Peru	173.6	127.9	962.9	786.1
So. Africa (including S.-W. Africa)	40.8	37.3	129.8	149.2
Total	297.7	205.6	1,440.9	1,135.2

1/Data not available.

2/Data available only for Jan.-Apr. 1966.



Oceanography

INDIAN OCEAN GIVES UP SOME SECRETS

The Indian Ocean has the hottest, saltiest water of any sea, the coldest surface water in the Tropics, and the fastest midsea current, report the scientists working with the International Indian Ocean Expedition.



Fig. 1 - Dr. Herman A. Fehlmann of the Smithsonian Institution, Washington, D. C., sorts sea snakes brought aboard by trawl during cruise in the Arabian Sea.



Fig. 2 - Two scientists from India, working guests, remove a sea floor sediment sample from a LaFond-Dietz bottom snapper.

From September 1959 to December 1965, 25 oceanographers from 15 nations explored the Indian Ocean using every tool at their disposal--modern research vessels, weather satellites, tramp streamers and large array

of electronic gear--and gathered an unusual amount of striking information.

An Indian Ocean Meteorological Center was set up in Bombay with United Nations aid. Now the only international collection of small marine animals or zooplankton is at the Indian Ocean Biological Center at Cochin.



Fig. 3 - Sea floor sediment samples are removed from dredge and put in glass jars for analysis.

Some Exploration Findings:

The existence of the Somali Current--a "western boundary current" running north past Africa and Arabia at speeds up to seven knots--was confirmed. (The Gulf Stream in the Atlantic and the Kuroshio in the Pacific travel at a maximum of four knots.) The Somali is the only boundary current to cross the equator and the only one that reverses itself with the seasons. Only surface deep, it races north during the summer when India's southwest monsoons are raging. When the monsoons die out, it reverses its path and heads gently south.

Near the Arabian coast, where the Current turns, the water's surface temperature drops to 55° F. because of the tremendous upwelling of cold water far below. This upwelling contains nutrients from the depths. The concentration of nutrients in the western Arabian Sea is twice as high as that in the North Atlantic. The expedition's biologists were surprised to see zooplankton actually clog the nets they lowered during this period.

However, at depths of more than 200 meters, the Indian Ocean is oxygen-deficient. When the cold upwelling water is brought closer to the surface, fish are unable to survive.

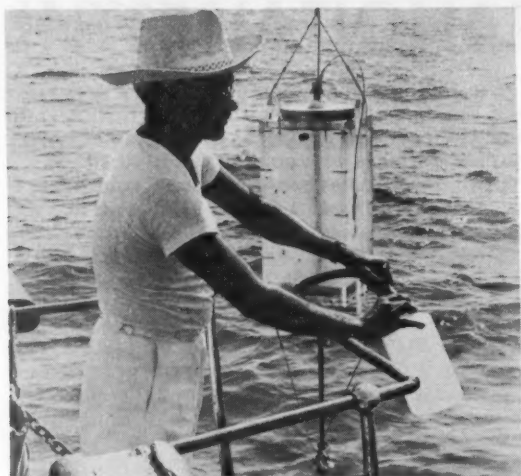


Fig. 4 - Drawing water from Dazler sampler for trace element chemical analysis.

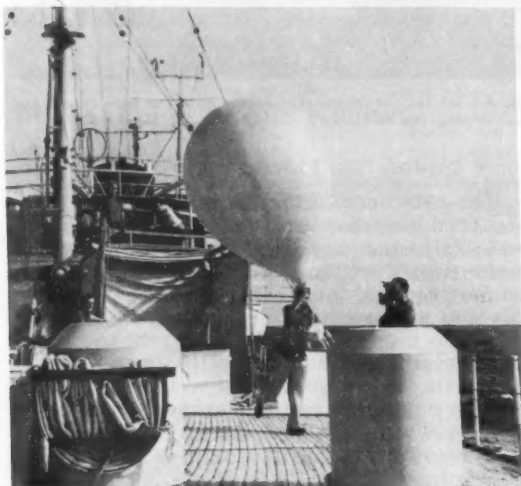


Fig. 5 - Launching weather balloon. Information from this and other sources enable scientists to gain better understanding of interaction between ocean and atmosphere. This interaction is key factor in the weather over much of the world.

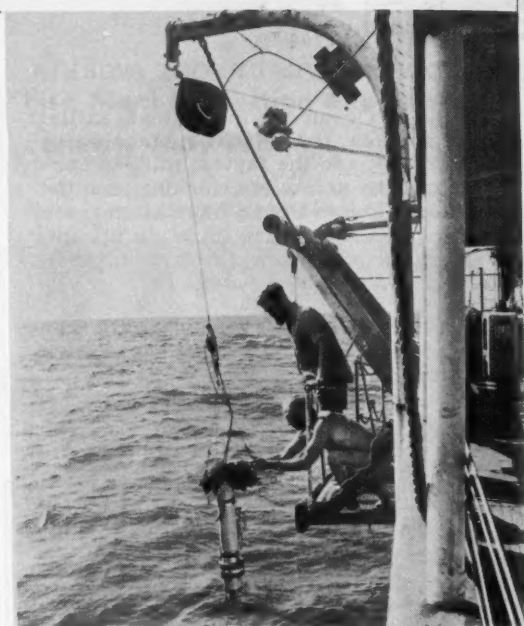


Fig. 6 - Scientists lower bathyphotometer into Indian Ocean. The researchers of the International Indian Ocean Expedition greatly expanded knowledge of what goes on under, in, and above the ocean.

Fishery explorations' improved techniques and more data should help increase the annual catch of fish from 2.5 million tons to 20 million within 35 years. Additional ports and modern freezing facilities will be necessary if increased catches are to reach the hungry millions. And storing and transporting fish must be updated to make the best use of scientific knowledge. (Reprinted with permission from *Science News*, weekly summary of current science, copyright 1966 by Science Service, Inc.)

Note: Photos were taken aboard National Science Foundation's research vessel *Anton Bruun*. NSF planned and coordinated United States participation in the International Indian Ocean Expedition.



FOREIGN

EUROPE

Denmark

COD-BLOCK INDUSTRY IS IMPORTANT U.S. SUPPLIER

The Danish frozen cod-block industry has been an important supplier to United States firms in recent years. The industry produces each year about 21,000 metric tons of cod blocks, and an increasing quantity is exported to the United States for use in fish sticks and portions.

The cod fishery annually produces about 68,000 metric tons (round fresh weight), according to the Danish Fisheries Ministry. Of this total, about 30 percent comes from fishing operations in the North Sea, 30 percent from the Eastern Baltic, 15 percent from the Belt Sea, 13 percent from the Kattegat, and about 6 percent from the Skagerrak.

Seasonal catches of cod are heaviest from January through April averaging about 9,000 metric tons monthly. Later in the year, monthly catches are about halved.

Denmark also produces substantial amounts of rospætte (plaice) and herring fillets.

The Danish Fishing Industry Association (Dansk Fiskeindustriforening), Esbjerg, Denmark, represents producers of all kinds of fish fillets. Eleven of its members produce cod blocks. The Association covers all Denmark except the Island of Bornholm. (U. S. Embassy, Copenhagen.)

MIDYEAR DATA MADE AVAILABLE

Data provided by the Ministry of Fisheries give this picture of the Danish fisheries for January-June 1966:

Catch: Landings of fish in local ports by Danish fishing craft were 5 percent less than during the same period of 1965. Herring landings were down 38 percent. Flatfish landings were off about 20 percent. Pond trout production was slightly below last year's record rate.

Cod landings were up 7 percent. The catch of codlike fish was up 179 percent; small haddock and whiting for reduction accounted for a large share of these catches. Landings of fish, primarily herring, in Danish ports by foreign fishing vessels declined 15 percent. Danish landings in foreign ports were more than double those of the first 6 months of 1965.

Average Prices: Average monthly prices for the main species of fish continued generally higher during the first half of 1966. Prices for plaice eased slightly in May because of good landings, but June prices were nearly the same as June 1965. Herring prices, responding to lower landings, were strong. Industrial fish prices held up as the world fish meal market continued strong. Salmon landings were about one-fourth below last year's record level, and salmon prices were very high, ranging from US\$1.13 to \$1.48 a pound.

Processing: The quantity of each major category of processed products, except smoked fish, was less than during the first half of 1965. Production of fresh plaice fillets was down 38 percent. With lesser quantities of herring available for reduction, production of fish meal, oil, and solubles was down 18 percent, 14 percent, and 5 percent, respectively.

Table 1 - Production of Some Processed Fishery Products, January-June 1966

Product	Jan.-June 1966	Change from	Year
	Quantity	Jan.-June 1965	1965
	Metric Tons	Percentage	Metric Tons
Canned:			
Herring & sprats. .	1,123	- 37	2,805
Mackerel	1,196	+141	1,897
Other fish. . . .	2,912	- 1	3,912
Crustacea. . . .	270	- 65	1,300
Mussels	186	- 38	710
Total	5,687	- 5	10,624
Fresh & frozen fillets:			
Cod.	15,895	- 3	26,596
Cod-like. . . .	1,959	+ 13	3,300
Plaice	4,785	- 38	17,054
Other flatfish. .	1,112	+ 11	2,151
Herring	24,929	+ 3	51,538
Other fish. . . .	43	- 58	114
Total	48,723	- 5	100,753
1/Haddock, coalfish, hake, ling, etc.			
Source: Danish Ministry of Fisheries.			

Table 2 - Danish Fishery Exports to the United States, January-June 1966 With Comparisons

Commodity	January-June 1966			Change from Jan.-June 1965		Year 1965		
	Quantity Metric Tons	Value		Quantity	Value	Quantity Metric Tons	Value	
		Kr. 1,000	US\$1,000				Kr. 1,000	US\$1,000
Fresh and frozen:								
Pond trout,	189	1,301	189	- 47	- 40	699	4,115	597
Salmon,	-	-	-	-100	-100	50	491	71
Flatfish,	53	570	83	- 50	- 43	177	1,858	269
Fillets:								
Flatfish,	12	58	8	+ 50	+ 35	274	871	126
Cod,	4,174	17,899	2,595	+ 58	+ 70	10,536	39,331	5,703
Other,	10	49	7	+233	+345	690	2,474	359
Norway lobster,	16	485	70	- 66	- 57	167	4,604	668
Other,	19	80	12	-	-	1	91	13
Total,	4,473	20,442	2,964	+ 39	+ 32	12,594	53,835	7,806
Salted & smoked	6	27	4	+ 0	- 39	53	228	33
Canned:								
Sprat & herring,	238	1,452	211	- 30	- 9	507	2,708	393
Shrimp,	34	371	54	- 43	- 38	122	1,376	200
Mussels,	70	353	51	+ 4	+ 18	152	706	102
Other,	29	139	20	+164	+104	36	259	38
Total,	371	2,315	336	- 23	- 9	817	5,049	733
Semi-preserved:								
Caviar,	20	247	36	+ 43	+ 68	25	302	44
Other,	18	28	4	+500	- 30	8	119	17
Total,	38	275	40	+138	+ 46	33	421	61
Fish solubles	225	237	34	- 50	- 49	600	642	93
Grand Total	5,113	23,296	3,378	+ 22	+ 24	14,097	60,175	8,726

1/ Mostly turbot, brill, plaice, and soles.

2/ Includes high-unit value trout eggs and low-unit value cod.

Supplies: With the catch down, supplies of certain fish for processing were inadequate to meet demand. The controversy over increased use of foreign-caught fish continued with processors asking a more liberal policy and fishermen opposing it. The Fisheries Ministry tried to reach a compromise by allowing imports of small quantities of raw fish.

Note: See *Commercial Fisheries Review*, July 1966 p. 68, Feb. 1966 p. 57.



East Germany

FIRST "ATLANTIK"-CLASS STERN TRAWLER LAUNCHED

The first of a series of Atlantik-class universal fishing trawlers has been launched at Stralsund. A contract with the Soviet Union provides for the delivery of over 100 Atlantiks. They will replace the Tropik-class stern trawlers built in the same East German shipyard since 1962 and now to be discontinued.

The Atlantik is superior to the Tropik in several ways: higher speed, more processing capacity, and faster propulsion. The yearly output of Atlantiks, now about 23 units per year, will be raised to 30 units by 1970, according to East German plans. Some of the newly constructed vessels will probably be used by the East German fishing fleet. Like the Tropik, the Atlantik is a universal fishing

vessel and can be used in both northern and southern latitudes. It is 82.2 meters (269.6 feet) long, 13.6 meters (44.6 feet) wide, with an engine of 2,630 horsepower. It can process more than 80 metric tons of fresh fish per day. The daily maximum processing capacity is 45 tons of frozen fish and 35 tons of fish meal.



Romania

STERN TRAWLERS REDUCE LENGTH OF VOYAGE

The Secretary-General of the Food Industries Ministry reported that Romanian stern trawlers have been able to reduce the length of their voyages to less than 120 days and still catch the planned amounts. Crews now are being trained for additional fishing vessels that will join the fleet in 1966-1970.

The stern trawler *Constanta* returned for unloading in July after a 110-day cruise in the Atlantic and was slated to depart soon for fishing zones south of Newfoundland. Romania's second stern trawler, the *Galati*, was fishing for herring off the Georges Bank south of Newfoundland.

There are new hatcheries in the Danube Delta and along the Danube. By the end of

the Five Year Plan (1966-1970), production of freshwater fish in the Delta will increase to 25,000 metric tons. The 1965 catch was 9,000 tons. (U. S. Embassy, Bucharest.)



Soviet Union

FIRST-HALF 1966 CATCH UP SLIGHTLY

Soviet fishermen landed about 3.2 million metric tons of fish, shellfish, and other aquatic products during the first half of 1966, only 2 percent more than during the first half of 1965. Despite this, the sales of fishery products increased 8 percent over January-June 1965. It indicates better utilization of catch and progress in removing the bottlenecks of recent years. (*Pravda*.)

(Editor's note: The growth rate of the catch during the first half of 1966 was the lowest since 1960.)

CATCH OF PACIFIC OCEAN PERCH ROSE IN 1965

Soviet fishermen landed 276,100 metric tons of Pacific ocean perch in 1964 and 384,000 tons in 1965. They fish for perch on three major grounds: the Bering Sea, the Gulf of Alaska, and along the Aleutian Islands. The catches for these 3 areas are:

	1965	1964
	.. (Metric Tons) . . .	
Bering Sea.	9,100	10,500
Aleutians.	64,500	55,500
Gulf of Alaska . . .	310,400	210,100
Total	384,000	276,100

In 1964--103 Soviet fishing vessels (exclusive of support ships and including only medium and stern factory trawlers) operated in the Pacific ocean perch fishery; in 1965, the number was 115. In 1966, an estimated 115-120 vessels were landing Pacific ocean perch from the three fishing grounds and, in addition, some of the vessels moved south to fish for ocean perch and Pacific hake off the coasts of Oregon and Washington. (U.S.S.R. Ministry of Fisheries.)

NEW OCEAN PERCH FISHERY OFF NORTH KURIL ISLANDS

In early August 1966, the Far Eastern Fisheries Administration began to fish for Pacific ocean perch off the North Kuril Islands (south of Paramushir Island). This fishery is still in an experimental stage and only 1 or 2 Sakhalin large stern freezer trawlers are fishing the area. Average daily catches run about 50 metric tons; the highest daily catch exceeded 70 tons. As a result, other vessels will probably be sent to the area. The extent of the resource is not known. It is impossible to say now how many vessels it will support.

BUDGETS 66% FOR FISHERY INVESTMENTS

The Soviet Union plans to budget 2,921 million rubles (US\$3,242 million) as capital investment in her fishing industry and fleet during the present 5-Year Plan (1966-1970), or about \$650 million a year. These sums do not include funds to build houses for fishermen, fishery workers, and administrators. The level of 1966-1970 capital investments is 66 percent higher than during the 1960-1965 period--when about 1,760 million rubles (US\$1,954 million) were invested in the industry (or about \$352 million per year). (*Rybnoe Khoziaistvo*.)

TUNA FACTORY MOTHERSHIP WORKS INDIAN OCEAN

The Soviet tuna factory mothership, the Svetlii Luch, departed the fishing base on Shikotan Island at the end of August 1966 for several months' operation in the Indian Ocean. It stopped first in the Southern Kuril Islands where a large Soviet fishing fleet catches Pacific saury to obtain bait. The species sought are tuna and, for the first time, squid.

The vessel was bought from Japan in 1965, with 4 other identical vessels, for about US\$20 million. The terms were 30 percent down, the rest in semiannual payments of 5 percent of the total price. The Luch-class of tuna motherships has a capacity of about 5,300 gross tons and accommodations for a crew of 180; the vessels are 115 meters long and can operate for about 4 months without resupplying.

The Luch went on her maiden cruise to the tropical Pacific in May 1965 for about 4-5 months. The second trip began in October 1965 and ended in early April 1966. During that voyage about 400 metric tons of tuna were caught and canned.

Canned tuna is retailing in Moscow stores at 0.80 rubles (\$0.89) a can (about 7 ozs.).

FINDS LARGE RESOURCES IN BERING SEA

Researchers of the Pacific Ocean Scientific Research Institute of Fisheries and Oceanography (TINRO) reported in mid-July 1966 completion of a series of deep-water studies in the Bering Sea. Their objective was to explore deep-water fish resources and to determine the possibility of their commercial exploitation.

They announced very promising results. Large amounts of valuable species, such as halibut, grenadier, and sablefish, were found at depths of about 225 to 300 fathoms with one-hour drags--producing about 8 metric tons of fish. Trial drags to a depth of about 400 fathoms also produced good catches. Based on their conclusions that commercial exploitation was feasible at those depths, many fishing vessels were sent to the unspecified area of the Bering Sea.

POLISH-BUILT FACTORY MOTHERSHIP DESTINED FOR ATLANTIC

On July 29, 1966, the B-69-type factory mothership Profesor Baranow was launched

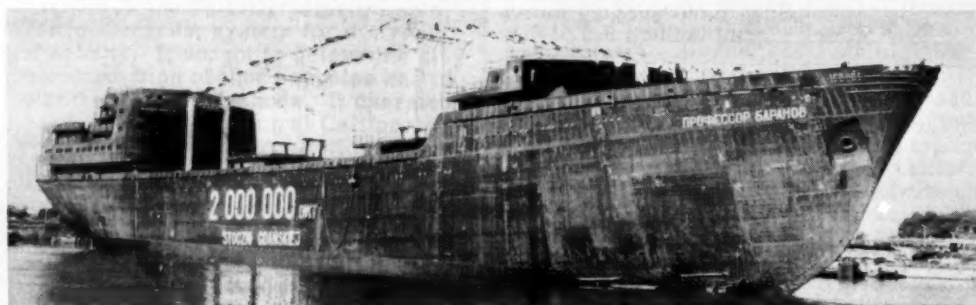
in Gdansk, Poland, for the Soviet Union. Its specifications: length overall: 164 meters (538 feet); breadth moulded: 21.3 meters (70 feet); capacity: 10,000 deadweight tons; main engine: 7,200 horsepower; speed: 15.3 knots; and endurance 75 days. The vessel's purpose is to support a fleet of catcher vessels in the Atlantic. It is said to have processing equipment for fish meal and salt herring and 2 cod-filleting lines.

The Profesor Baranow is typical of the large fishing vessels being built by the Gdansk Shipyard, which started production in 1947 with small steel fishing cutters. Since then it has developed into an important maritime center, building tankers, cargo vessels, and large fishing vessels. The yard reported its total construction had reached 2 million deadweight tons with the launching of the Profesor Baranow.

MOVES TO EXPLOIT SOUTHWEST ATLANTIC FISHERIES

After several years of intense research along the eastern coasts of South America, the Soviet Union is moving to exploit the fishery resources of the Southwest Atlantic. Several exploratory fishing vessels have been operating on the Patagonian Shelf since early spring 1966. The catch was reportedly satisfactory.

In May 1966, a special organization was formed at Kaliningrad to plan the orderly and intensive exploitation of the southwest Atlantic fishing grounds. Called the Kaliningrad Command of the Distant Fishing Fleet (Kaliningradskaya Baza Expeditzionnogo



Factory mothership Profesor Baranow after launching at Gdansk.

Flota), it will base its ships in the Havana fishing port. Initially, the Soviet fleet there will number 30 vessels: 15 large stern trawlers of the Tropik-class (2,600 gross tons) and 15 medium freezer side trawlers of the Maiak-class (700 gross tons). All Tropik-class vessels and most Maiaks have been delivered to the new Kaliningrad Command, though not all have been sent to Cuba. In late summer 1966, the Tropik-class stern trawlers were fishing with vessels of the Kaliningrad Fisheries Administration on Georges Bank. The medium freezer side trawlers were operating with Cuban fishing vessels on the Campeche Banks off Yucatan Peninsula in southern Gulf of Mexico.

EXPANDS FISHERY RESEARCH

South Pacific: A new fishery research vessel, the Raduga, was delivered to the Pacific Institute for Fisheries and Oceanography (PINRO). She sailed on her first cruise to the South Pacific in August 1966 for 6 months. The Raduga is looking for demersal species off New Zealand and Australia and for pelagic species in the Indian Ocean.

According to Soviet scientists, prior research expeditions to the same area discovered large stocks of bottomfish off New Zealand. However, an estimated 70 percent of those stocks became unavailable when New Zealand extended her fishery limits to 12 miles.

North Atlantic: Two Soviet oceanographic and fishery research vessels, the Okeanograf and the Aisberg, are conducting fishery research west of the British Isles in the stream of the North Atlantic Current. The 4-month long cruise began on July 1, 1966, when the Okeanograf sailed from Leningrad and the Aisberg from Murmansk. The two vessels met between Faroe and Shetland Islands to carry out simultaneous oceanographic and fishery research. It is believed this research will be of great value for Soviet fishing in the North Atlantic and confirm previous observations by other Soviet research expeditions.

The oceanographic research vessel F. Nansen left Murmansk for the Norwegian Sea earlier this year. She belongs to the Polar Research Institute for Marine Fisheries and Oceanography (PINRO) and is carrying out oceanographic research together with Icelandic and other Soviet research vessels.

Some time ago, Norway, Iceland, and the U.S.S.R. concluded an agreement for joint herring research. It may be that a similar agreement has also been reached for oceanographic research, although no details are known.

Red Sea: The fishery research vessel Akademik Kovalevskii left its home port in mid-1966 for a 3-month research cruise in the Red Sea. It is affiliated with the U.S.S.R. Institute for the Study of the Biology of the Southern Seas at Sevastopol on the Black Sea. The cruise's primary purpose is to study the plankton of the Red Sea and its connections to the Mediterranean and Black Seas. It was organized by the Ukrainian Academy of Sciences (Kiev). The plankton distribution is also being studied for possible use in marine fish culture. The 630-gross-ton vessel has aboard about 20 scientists.

Constructed in 1950 in East Germany, the Akademik Kovalevskii has long been in the forefront of Soviet oceanographic and fishery research. Most of the research was conducted in the Mediterranean and some in the Adriatic Sea. In July 1964, she was the flagship of a more-than-year-long joint Soviet-Cuban expedition studying the fisheries biology of the Gulf of Mexico and the Caribbean Sea.

CLAIMS PERFECTION OF SEMIAUTOMATIC CRAB PRODUCTION LINE

The Russians say they have perfected a semiautomatic continuous crab production line which will replace "many tens" of crab-processing workers aboard crab factoryships. Several of the lines are now being tested by crab factoryships. Presumably, the lines are also aboard vessels operating in the eastern Bering Sea.



Spain

FISHING FLEET GROWS RAPIDLY

The Spanish fishing fleet has become one of the largest and most modern in Western Europe. Ninety-seven Spanish freezer-trawlers with a total processing capacity of 2,500 tons a day have been placed in service since 1961. These vessels constitute one-fourth of



Fig. 1 - Freezer stern trawler built in Vigo, Spain, and put into service in 1963.

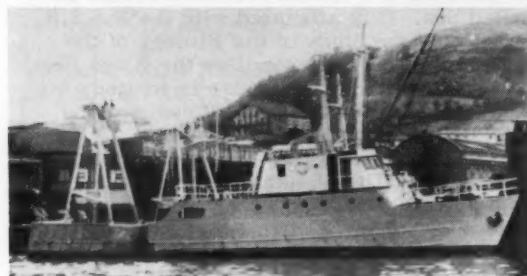


Fig. 2 - Freezer stern trawler built in 1965 for fishing shellfish. It is 158 gross registered tons.



Fig. 3 - Freezer stern trawler built in 1964 designed for fishing shellfish and finfish. It is 929 gross registered tons.

Distribution of Spanish Fishing Fleet by Tonnage Class, December 31, 1965		
Tonnage Class	No. of Vessels	Total Gross Registered Tons
Long-range fleet:		
Over 500 tons	66	-
250-500 tons	188	-
Total 250 tons and over . . .	254	135,434
150-250 tons	614	-
100-150 tons	541	-
Total 100-250 tons	1,155	182,237
Total long-range fleet	1,409	317,671
Short-range fleet:		
50-100 tons	1,048	-
20-50 tons	1,417	-
Total short-range fleet	2,465	124,754
Grand Total Fleet	3,874	442,425

the total gross tonnage of the long-range Spanish fishing fleet. Under the Law for Renovation of the Fishing Fleet, the Spanish Government provided credits during 1961-1965 of \$78 million for building 383 new vessels. During 1965, 173 of those vessels put to sea. (U. S. Consul, Bilbao.)



United Kingdom

BUYS LARGE FREEZER STERN TRAWLERS FROM POLAND

Two Hull trawler companies have contracted with Centromor--Poland's export agent for fishing and merchant vessels--for delivery of 4 large freezer stern trawlers. The 208-foot trawlers are the first such vessels ordered in non-British Shipyards and brings to 10 the stern trawlers on order by British fishing companies in British and non-British yards. The reasons for using Polish shipyards at Gdynia are low and fixed prices and guaranteed delivery dates (mid-1968).

The trawlers are the B-28 type, with crew of 28, an endurance of 55 days, daily fish-freezing capacity of 30 metric tons, and storage holds with capacity of 350 tons. The contracted price was not reported. (Fishing News.) French companies also ordered an unspecified number of B-28 trawlers from the same Polish shipyards.



Yugoslavia

ENTERS ATLANTIC TUNA FISHERY

The first Yugoslav high-seas tuna clipper, *Jugoatlantik-I*, arrived at Abidjan, Ivory Coast, August 9, after her maiden voyage near Annobon Island (off Gabon). She had 50 tons of yellowfin and skipjack. Built at Pula Shipyards in Yugoslavia, she will be joined by 2 sisterships off West Africa.

Vessels of the *Jugoatlantik*-class are 47 meters (153 feet) long and 9.5 meters (30 feet) wide. They are equipped with 1,100 by 117 meter (3,608 by 383 feet) purse seines, powerblock and hydraulic winch, and 15-ton diesel-powered steel hull seine boat. The 5-hold capacity is 425 metric tons.



The 153-foot Tuna Clipper Jugoslavanki which is first of 3 U. S.-style Yugoslavian tuna vessels to arrive in West African waters. (Photo by Regional Fisheries Attache)

The Yugoslavs plan to land the catches of the 3 tuna vessels at Abidjan, Monrovia, Freetown, and Dakar--depending on which port is closer to area of operations. (U. S. Embassy, Abidjan.)



ASIA

Japan

FROZEN TUNA EXPORTS TO U. S. RISE

The Japan Frozen Foods Exporters Association reports that 35,595 short tons of frozen tuna were exported to the United States April-June 1966--compared to 32,782 tons for the same period in 1965. Exports of tuna to overseas bases, such as American Samoa, increased substantially from 1,990 short tons in 1965 to 6,293 tons in 1966. (Suisan Tsushin.)

Japanese Frozen Tuna Exports, April-June 1966				
Type	U.S.	Overseas Bases	Other Countries	Total
	(Short Tons)		(Metric Tons)	
Tuna:				
Albacore 1/	13,544	3,944	1,404	17,266
Yellowfin 2/	15,574	1,925	7,249	23,121
Bigeye 2/	1,218	417	3,804	5,287
Skipjack 1/	3,816	7	276	3,743
Bluefin 2/	-	-	458	458
Loins:	1,443	-	-	1,309
Total Apr.-June 1966	35,595	6,293	13,191	51,184
Total Apr.-June 1965	32,782	1,990	19,202	50,740
1/Round fish.				
2/Gilled and gutted, dressed, and fillets.				

ALBACORE SEASON POOR, SKIPJACK EXCELLENT

The 1966 summer pole-and-line albacore tuna fishery ended poorly as predicted. The season's landings were a low 18,000 metric tons through June. Total landings are actually less because the 18,000 figure includes 3,000 tons of "spring albacore" taken far off-shore (mainly east of 145° E. longitude between 32°-35° N. latitude) in March and April before the summer fishery started. Landings were 42,000 tons in 1965, 24,000 in 1964, and 26,000 in 1963.

The short supply of albacore pushed ex-vessel prices in Japan to a high level. Prices held steady around 171 yen a kilogram (US\$431 a short ton) compared to the 1965 average price of 102 yen a kilogram (\$257 a short ton).

In contrast, 1966 is an excellent year for skipjack. Landings at the principal tuna port of Yaizu for January-June 1966 totaled 29,048 metric tons--16,568 tons more than the 1965 catch for the same period. Skipjack fishing off the Sanriku coast (northeastern Japan) was reported very good. It was forecast that the summer catch there may easily exceed 70,000-80,000 metric tons--far surpassing last year's catch of 40,000 tons. (Suisancho Nippo; Katsuo-Maguro Tsushin, and other sources.)

SOUTH KOREA AND TAIWAN PACIFIC TUNA CATCH TO TOP JAPAN'S

South Korea and Formosa will surpass Japan in landings from the Pacific tuna fishing grounds. (Fisheries Attache, U. S. Embassy, Tokyo, from Suisan Keizai.)

A survey by the Frozen Tuna Export Association produced these figures for 1966:

Landings of Tuna		
Country	May	June
	.. (Metric Tons) ..	
Japan	10,890	11,730
South Korea	11,000	12,000
Taiwan	8,000	10,000

PURSE-SEINES TUNA
IN EASTERN ATLANTIC

The 90-gross-ton tuna purse seiner Hakuryu Maru found good fishing. One of two vessels contracted this year by a Japanese firm to fish the eastern Atlantic Ocean, she began in late June. As of July 20, she had landed 140 metric tons--skipjack and yellowfin in about equal quantities.

The second purse seiner, Seisho Maru No. 10, 90 gross tons, has not fared well due to propeller trouble from the outset. Her catch during the same period was only 80 tons, mostly small yellowfin.

The Kuroshio Maru No. 81, 145 gross tons, assigned to the company's Chichibu Maru mothership fleet, was reported to have landed 23 tons of tuna in about a week's operation in the eastern Atlantic. (Katsuo-maguro Tsushin.)

CANNED TUNA EXPORTS
TO WEST GERMANY DECLINE

Exports of canned tuna in oil to West Germany--its largest export market for this--declined drastically at midyear. Tight money and high interest rates in West Germany were blamed. As a result, West German buyers are said to be offering very low prices for Japanese canned tuna products, and this has largely depressed sales to that country.

From April 1965-March 1966, exports of tuna in oil totaled 765,564 actual cases, equal to 41 percent of total exports to all countries excluding the United States.

The export price of Japanese canned skipjack in oil dropped to US\$7.50 per case c.i.f., declining over \$1 a case since spring 1966. Exports to West Germany of a specialty-pack tuna (described as "dressing tuna") also declined, but the decline was attributed to the refusal of Japanese packers to reduce the relatively high price of that product compared with oil-packed tuna. (Suisan Tsushin, and other sources.)

TRANSSHIP SHRIMP FROM
COMMUNIST CHINA

The Japanese trade intends to use a new method for intranational trade in spring shrimp imported from Communist China. It will prevent waste of foreign currency and not disturb the domestic market where local shrimp is oversupplied. The shrimp will be held in bond and transshipped without formally entering Japan. It is planned to transship from Kobe to Great Britain 75 tons of spring shrimp in this way, and an additional 25 tons will be transshipped to Rotterdam. (Fisheries Attache, United States Embassy, Tokyo, from Suisan Keizai.)

MAJOR FIRMS LOOK FOR NEW GROUNDS

Large Japanese fishery companies are trying to develop new fishing grounds to compensate for restrictions by many nations of fishing off their coasts. This search for new grounds will intensify.

The Government's Fishery Agency is reported considering construction of a large fishery survey vessel to assist the fishery industry in discovering and exploiting new grounds.

Before, companies looked for new grounds during "spare time" in normal operations. Today, they are systematizing such experimental fishing operations. These operations are becoming more costly in dwindling resources of established grounds and more urgent as national prohibitions increase.

One large company is centralizing plans for exploration. In the past, exploration was conducted individually by its fishing sections. It is also emphasizing development of techniques for improving trawl fishing, fishing for bonito, tuna, mackerel, and land-based whaling in still-undeveloped fishing grounds. It has started to improve deep-sea trawling. It hopes to advance into drag-net fishing for herring and cod in the North Atlantic.

A second company is promoting deep-sea trawling with 3,000- to 3,500-gross-ton trawling vessels. It is constructing a 550-gross-ton survey vessel primarily for developing new grounds in the North Pacific. The company now has two drag-net vessels conducting

experimental fishing for crab and fish in the Okhotsk Sea, 40 miles off Kamchatka Peninsula.

Another company is trying to expand in trawling and tuna fishing as its fishing for salmon, its chief operations so far, appears destined to decrease with the advance of the Soviets and Koreans in salmon fishing. It has developed new fishing grounds off Sierra Leone and is conducting experiments to employ reel-net fishing. It has three vessels engaged in drag-net fishing in west African waters to develop new mackerel fishing grounds.

Another firm is building up its deep-sea trawling to make up for a reduction of whale catches. It now ranks third in this field. Since 1965, it has been probing new grounds southeast of New Zealand and off the Argentine coast.

And, in June 1966, another fishing firm became the first to explore new grounds for salmon in the Arctic Sea. (The Japan Economic Journal, Tokyo.)

EXPANDS TRAWL FISHING IN NORTHEAST PACIFIC

The Japanese Fisheries Agency issued licenses in late July 1966 to two major companies to operate experimentally four trawlers east of 135° W. longitude and north of 30° N. latitude in the northeastern Pacific off the North American coast. The two firms already operate the stern trawlers Taiyo Maru No. 82 (2,886 gross tons) and the Kirishima Maru (3,495 gross tons) in the Gulf west of 135° W. longitude. Each of the two trawlers is accompanied by a 500-ton trawler.

Another large firm plans to conduct experimental fishing in the same area. This company operates the 3,500-ton stern trawler Takachiho Maru in the Gulf. The trawler will be joined by the 550-ton trawler Mogami Maru, which was delivered August 1. After a trial run in the Japan Sea, the Mogami Maru departed Japan around August 9.

The opening of fishing grounds east of 135° W. longitude and north of 30° N. latitude will make it possible for the Japanese Gulf of Alaska trawl fleet to operate year-round.

In winter, when sea conditions are bad in northerly latitudes, the trawlers will exploit the waters farther south. The trawlers will seek hake and other species. (Suisan Tsushin; Shin Suisan Shimbun Sokuho, and other sources.)

REPORTS NORTH PACIFIC WHALING DATA

The catch of whales in the North Pacific passed the 60 percent mark July 25, 1966:

	Sperm	Finback	Sei	BWU ^{1/}
<u>Kyokuyo Maru</u> ..	-	567	764	411
<u>No. 3 Nishin Maru</u> 1,186	-	-	-	-
<u>Nichiei Maru</u> ...	-	-	-	260.5

The Nichiei Maru was expected to attain her quota and then hunt only sperm whales. The Kyokuyo Maru's quota is 1,080 whales, of which 844 are finback whales; she must catch 277 finback whales and 236 sei whales to fill her quota. The problem is to catch proper ratio of finback to sei whales.

There has been no progress in talks on export price of finback whale oil. Market conditions are reported bad. New stocks may be stored in Rotterdam pending developments. It is expected that 10,000-12,000 metric tons of sperm whale oil from the North Pacific will be exported to companies in the United States and Europe at a price of US\$201.60 a ton. (Fisheries Attache, United States Embassy, Tokyo, from Suisan Keizai and Suisan Tsushin.)

^{1/}Blue-whale units.



Communist China

BEGINS TO DEVELOP TUNA FLEET

A 319-gross-ton tuna longliner ordered by Mainland China's Technical Advancement Corporation from a Japanese shipyard at Shimizu was delivered to the Chinese owners about August 1, 1966. The vessel was taken to the port of Huang Pu (near Canton in Kwangtung Province) by a Japanese crew.

Communist China has apparently decided to enter high-seas tuna fishing. This is the first indication of the expansion of Chinese

fishery operations into areas distant from her coast. Her initial fishing bases will be the ports of her southern provinces adjacent to the South China Sea. (Nihon Keizai Shimbun.)

To train a crew for the longliners and others that may be built, the Chinese sent 6 fishery experts to Japan in July for two months of technical training in handling tuna vessels and equipment.



Republic of Korea

FIRST VESSEL SURVEYS NORTH PACIFIC

The 389-ton training vessel Paik Kyung Ho of the Pusan Fisheries College recently completed a 3-month exploratory cruise of the North Pacific, the first ever carried out by that nation. The vessel was sent because of: (1) intensive competition on the fishing grounds off South Korea; (2) numerous international restrictions in the East China Sea; (3) a declining catch trend in the South Pacific tuna grounds where about 100 tuna vessels are operating.

The vessel was reported to be seeking such species as salmon, flatfish, and Alaska pollock. The crew consisted of 10 scientists and 34 trainees.



Taiwan

TUNA FLEET EXPANDS

The Government of Taiwan is making available this year about US\$1.7 million to help finance the development of the tuna industry. The loan is paying for purchases from Japan of used tuna fishing vessels with a combined gross tonnage of 5,000 tons. Borrowers must construct one new tuna vessel in Taiwan for every three used vessels they buy from Japan.

SELLS INDIAN OCEAN ALBACORE IN SOUTH AFRICA

Most of the 16 tuna long-line vessels built by Taiwan under funds provided by the World

Bank are operating in the Indian Ocean. Some of them were reported to have landed their albacore catches at Cape Town, South Africa--for ex-vessel US\$355 a short ton for shipment to Puerto Rico. (Note: Freight from Cape Town to Puerto Rico is \$85 a ton.) This price is equivalent to ex-vessel \$385 a short ton, delivered Las Palmas, or about \$10-15 a ton lower than the price of Japanese-caught albacore landed at Las Palmas. (Suisan Tsushin.)



Thailand

SOUTHEAST ASIAN RESEARCH CENTER TO BE SET UP

At the Southeast Asian Ministers Conference held in Tokyo earlier this year, Thailand proposed creation of a Fishery Development Research Center in Thailand to train fishery specialists to develop the fishing industries of southeast Asian countries. Thailand would provide the land and buildings; Japan the research equipment, a 500-ton fishing vessel, and 5 to 6 researchers; and all participating countries would share operating costs.

To promote the center, Japan dispatched a preliminary survey group in September to the Philippines, Thailand, Burma, Cambodia, Indonesia, and Malaysia to observe fishing conditions. Japan plans to budget about 400 million yen (US\$1.1 million) for the program. (Nihon Suisan Shimbun.)



AFRICA

Kenya

FISHING INDUSTRY EXPANDS

The Minister for Tourism and Wildlife signed an agreement in midyear establishing the Kenya Inshore Fisheries Limited. The new company is jointly financed by a British fishing company, the Kenya Government, and local business interests. The Government intends to transfer its shares to a fishermen's cooperative--which it hopes will evolve. The Assistant Minister for Health will be company chairman.

To increase production, the new firm will introduce modern fishing methods on the coast. It has storage facilities to handle 50 to 60 tons of fish a month for local consumption. It will set up buying centers along the coast and small shops in Mombasa. The British company will provide technical and overseas marketing assistance.

At first, the company plans to concentrate mainly on shrimp and other shellfish for which there are good domestic and foreign markets. Plans are being considered for marketing tuna and marlin, particularly in Japan, and for promoting marine fish sales in inland Kenya. Protective export and import licensing for shellfish has been instituted and the Government may take further action to give the new firm a trade monopoly for certain types of fish to ensure a market and stabilize prices.

Development of the Fishing Industry: The revised Development Plan (1966-70) calls for total capital expenditure of about \$1,467,000 for fisheries development and tripled production--to reach 60,000 tons a year. Average annual revenue per producer is estimated at about \$389 per ton by 1970.

Expansion of the fishing industry was encouraged by favorable surveys in 1965 by two United Nations Food and Agricultural Organization teams. The teams investigated long-line fishing and marketing problems and potential for a mechanized industry.

A private Japanese group has looked into investment opportunities. In April 1966, a French expert sent by his Government under its technical aid program, conducted a feasibility study. He is studying deep sea fishing and extending the FAO survey to determine profitability and means of financing expansion. Also, the East African Marine Research Organization carried out intensive studies of exploitation of fishing on the Northern Kenya Coast. It estimated a potential annual catch worth about \$5.6 million.

Principal problems facing the fishing industry are: inefficient operations, equipment, and marketing; limited domestic market and storage and processing facilities; high prices due to outmoded means of production; and fishermen's lack of ambition and adherence to old methods.

Perhaps the biggest obstacle is that most Kenyans do not fish because of tradition, superstition, or the fact that fish are not available in rural areas. To counteract the general reluctance to eat fish and to create an adequate demand for the anticipated increased production, the Kenya Government launched an "Eat More Fish" publicity campaign costing about \$43,400. If successful, this campaign could result in the fishing industry providing substantial employment and a low-cost source of protein for the African population. However, longstanding consumption habits will be difficult to overcome. For the immediate future, most of the market for Kenya fish will be abroad. (United States Embassy, Nairobi.)



South Africa

INDUSTRY ASKS FOR 200-MILE FISHING LIMIT

The furor over foreign fishing fleets off the South-West Africa coast during August 1966 resulted in two separate moves to discourage foreign fleets from operating in South African fishing grounds: (1) The Transport Minister raised charges for transshipping fish in South African and South-West African harbors from about 28 cents to \$19.60 per ton; (2) the retiring president of the Walvis Bay Chamber of Commerce asked the Government to extend territorial fishing waters to 200 miles--to further curb foreign fishing operations and to protect the fishing grounds until a survey of available fish resources can be made.

According to the Namib Times, more than 100 foreign trawlers operate between Cape Town and Walvis Bay and their catch exceeds 500,000 metric tons per year. The Times also reported that another giant factoryship, the Vostok, displacing 45,000 tons, is being constructed in Leningrad for the Soviet fleet and will operate in the pilchard fishing grounds off South-West Africa.

The extension of territorial fishing waters to 200 miles is an oft-heard recommendation that uses Peru as a precedent. Following hearings in South-West Africa at the end of September 1966, the survey of the South-West Africa fishing industry is expected to say something about fishing limit in its report. (United States Embassy, Pretoria.)

PRODUCTION OF MAJOR PROCESSED PRODUCTS ROSE IN 1964-1965

Another record production of fish meal and oil was made in 1965 in South Africa and South-West Africa. As in 1964, the production of canned pilchard increased sharply. These increases were due to larger increases in South Africa. The 1964 record was due to increases in production by South-West Africa.

In 1965, both whale oil and sperm oil production increased substantially. (United States Consulate, Cape Town, and other sources.)

CANADA

TRIES TO STABILIZE YELLOW PERCH EX-VESSEL PRICES

The Government's program to stabilize yellow perch prices to Lake Erie fishermen which went into effect August 11 has now been extended to other yellow perch fishing areas of Ontario. The Canadian Fisheries Prices Support Board stands ready to purchase surplus supplies of frozen round or filleted perch from processors at prices sufficient to en-

Production of Major Fishery Products in South Africa and South-West Africa, 1964-1965

Production of Major Fishery Products in South Africa and South-West Africa, 1964-1965							
Product	Unit	South Africa		South-West Africa		Total	
		1965	1964	1965	1964	1965	1964
Canned:							
Pilchard.	Short tons	72,625	2,332	69,426	62,130	142,051	64,462
Maasbanker.	"	4,488	1,527	-	-	4,488	1,527
Mackerel.	"	4,237	8,152	-	-	4,237	8,152
Spiny lobster.	"	49	-	55	164	104	164
Frozen:							
Spiny lobster tails.	"	3,710	3,325	2,756	2,730	6,466	6,055
Pilchard.	"	-	-	936	1,020	936	1,020
Industrial:							
Fish meal.	"	300,086	108,803	170,856	175,186	470,942	283,989
White fish meal.	"	7,225	9,320	-	-	7,225	9,320
Fish body oil.	Long tons	55,195	21,857	34,447	48,159	89,642	70,016
Whale oil.	"	5,333	4,122	-	-	5,333	4,122
Sperm oil.	"	12,386	10,778	-	-	12,386	10,778



Libya

BUYS VESSELS FROM POLAND

A \$3 million contract for 33 fishing vessels has been awarded to a Polish firm. The goal is to increase annual fisheries production to 15,000 metric tons.

Thirty fishermen have been trained. In Tripoli, a warehouse was opened to provide fishermen's services and supplies, and a wholesale fish market is being built.

All this is part of a five-year (1963-1968) development plan. The funds to finance the projects come from petroleum revenue. By law, 70 percent of this revenue must be devoted to economic development. (United States Embassy, Tripoli.)



sure that Ontario fishermen receive a minimum of 10 cents a pound at point of landing. It is expected that processors will continue to sell maximum quantities into domestic and export channels and rely on sales to the Board only when landings exceed the market's capacity to absorb current production. It may be that market demand will keep the price above the minimum established by the Government. (Canadian Department of Fisheries, Ottawa.)

Note: See Commercial Fisheries Review, Sept. 1966 p. 50.

LOOK FOR HERRING IN GULF OF ST. LAWRENCE

Canadian plans for an East Coast fish meal industry were encouraged by test fishing in the Gulf of St. Lawrence in the summer of 1966. The explorations were made off Mackerel Point in the Gaspé area by the 80-foot purse-seiner Western Ranger, chartered by the New Brunswick Department of Fisheries under a cost-sharing agreement with the Federal Department of Fisheries. It was brought from British Columbia for the experiment.

In 30 days, the vessel landed 1,600 tons of herring at Caraquet, N.B., for reduction to meal. It is demonstrating the effectiveness of West Coast purse-seine methods to Eastern herring fishermen who have been limited to small-scale operations. The seine net used was 325 fathoms long and 36 fathoms deep. In catches off Mackerel Point, the net depth had to be reduced because herring were found there in 30 fathoms.

In addition to the skeleton crew that sailed it to New Brunswick from Vancouver, B. C., the vessel employs 5 East Coast fishermen. Exploratory work elsewhere in the Gulf will be carried out during the balance of the charter. (Canadian Department of Fisheries, Ottawa.)

MID-JULY SALMON CATCH GOOD IN BRITISH COLUMBIA

As of July 15, 1966, the northern fishing areas of British Columbia reported unexpectedly high catches of pink and sockeye salmon in the net fisheries. One million early pink salmon were taken from the run to Whale Channel and the run was expected to peak in August. During the first two days, 92,000 sockeye were taken in the Skeena River. Troll catches of king and silver salmon were also good. (Canadian Department of Fisheries.)



LATIN & SOUTH AMERICA

Cuba

EXPANDS FISHING FLEET

From 1961 to May 1966, Cuba added over 680 small vessels built in her shipyards to the fishing fleet and purchased 50 larger vessels abroad. Most of the latter came from Spain. Others were bought from Japan, the U.S.S.R., and Poland. Almost all were tuna vessels, except 6 cod trawlers bought from Spain in 1966 and 5 medium trawlers (SRTs) obtained from the U.S.S.R. in 1962. About 20 tuna vessels ordered from Spain are still to be delivered. However, the first cod trawler, the Manjuari, also purchased from Spain,

was delivered to Havana in March 1966 and soon after began fishing for cod off the Canadian Atlantic coast. The crew is Cuban, but the captain is Russian. (It docked at St. John's, Newfoundland, on June 27, 1966, for servicing.)

Cuban shipyards employ about 2,500 workers and build 7 classes of wooden fishing vessels 60 to 120 feet long. They are beginning to construct a few steel vessels. By 1970, the Cubans hope to have 700 large vessels (mostly in tuna and possibly cod and other bottom fisheries) and 900 small craft. The planned catch for 1970 exceeds 200,000 metric tons a year. Almost 4,000 young Cubans are now being trained in marine and fishery schools.



Chile

PRODUCTION OF FISH MEAL AND OIL RISES

Anchovy fishing in northern Chile during June 1966 was considered good. Landings totaled 99,600 metric tons, compared with 15,900 tons in 1965, and 93,700 tons in 1964. Nineteen percent was landed at Arica and 81 percent at Iquique; fishing in the Pisagua and Tocopilla areas was discontinued. The greatest fishing activity was in the area bordering Peru, where the major part of the Arica and Iquique fleets fished.

The catches of the first 6 months of 1966 totaled 755,500 tons of anchovy, an increase of 181 percent over 1965 and 24 percent over 1964.

During June, 6 plants operated in Arica an average of 11 working days; 21 plants operated in Iquique an average of 16 working days. One plant in Arica, 2 in Pisagua, and 1 in Iquique did not operate.

Monthly production of fish meal during the first halves of 1964-66 was:

Month	1966	1965	1964
	(Metric Tons)		
January	33,500	12,836	24,131
February	27,182	11,370	23,575
March	13,538	10,278	4,767
April	114,068	3,587	16,373
May	26,708	4,090	16,233
June	18,778	2,988	17,271
Total January-June . .	133,774	45,149	102,350

The company with the highest production from January through June 1966 totaled 24,000 tons of fish meal. An individual plant in Arica produced 13,700 tons; others produced 9,500 tons, 8,700 tons, and 8,200 tons, respectively. These 6 plants represent 48 percent of total fish meal production.

The recovery of fish oil in June amounted to 3,200 metric tons. Total production for the first 6 months of 1966 amounted to 14,400 tons, compared with 5,800 tons in 1965 and 12,600 tons in 1964. The yield of recovery in June was 3.2 percent (1965, 1.2 percent; 1964, 3.7 percent; 1963, 3.0 percent). The highest yield of oil during the first half occurred in April (3.3 percent), which coincides with the 1965 results.

Fish meal produced locally between Antofagasta and Talcahuano from other species (hake, sardine, jack mackerel, fish waste, etc.) and which supplies mainly the domestic market, totaled 1,700 tons in June 1966. The total of 15,700 tons during the first half was up 14 percent over 1965 and 97 percent over 1964. Of this year's production, Antofagasta produced 2,800 tons; Coquimbo 400 tons; San Antonio 2,400 tons; and Talcahuano, 9,700 tons.

During the first quarter of 1966, the Customs Bureau reported exports of 51,424 tons of fish meal, valued at US\$7,228,000 and 197 tons of shellfish meal worth US\$14,100. Exports of fish meal by months were: January 7,304 tons; February 18,958 tons; and March 25,168 tons. The main buyers were the United States, the Netherlands, and Germany.

Exports of oil during the first quarter amounted to 2,486 tons with a value of US\$441,300 and was purchased entirely by the Netherlands. (U.S. Embassy, Santiago.)



Mexico

MAY BUY YUGOSLAV VESSELS

An investment group from Ensenada discussed in mid-summer with a Yugoslav trade mission the purchase of 5 vessels from Yugoslavia. The group is considering entry into the high-seas fisheries. The Federal Government is reportedly prepared to help with an allocation of 75 million pesos (US\$6 million).



WEST INDIES

Trinidad and Tobago

SHRIMP PROJECT NEARS COMPLETION

The plan to give Trinidad and Tobago a shrimp fishing industry costing TT\$1.2 million (US\$700,000) was nearing completion, according to reports from Port-of-Spain. Twelve shrimp trawlers are being built. A shrimp-packing plant will be constructed at King's Wharf, Port-of-Spain. (*Fishing News International*.)



SARGASSO SEA TO BE CHARTED BY SCANDINAVIANS

Sargasso Sea, home of a floating mass of seaweed that for centuries has been a feared legend among seafarers, is about to be investigated by today's scientific Norsemen.

A joint expedition of Swedish and Danish scientists left for the Sea in early 1966 aboard the Danish research vessel *Dana*. The Danish scientists will be checking a belief that Scandinavian eels hatch their eggs among the tangled strands of weed. The optics of the Sea, which are affected by millions of brown algae, or *Sargassum*, will be investigated by the Swedish team, under the direction of a scientist of the Oceanographic Institute in Gothenburg, Sweden. (Reprinted, with permission from *Science News*, weekly summary of current science, copyright 1966 by Science Service, Inc.)

Foreign Fishing Off United States Coasts, August 1966

IN NORTHWEST ATLANTIC

U.S.S.R.: The July fog and haze off Georges Bank and vicinity continued into August, again restricting visibility and the observations of Soviet fishing. The estimated size of the fleet declined from an estimated 125 in early August to about 50 by month's end.

The decrease in Soviet fleet on Georges Bank occurred rather early this year. In 1964, it had decreased abruptly (by about 50-60 vessels) only in October--when most vessels transferred operations to southeastern Atlantic off Africa's coasts. The pattern was repeated in 1965. In 1966, however, to save fishing time, the Russians decided not to transfer their northwest Atlantic trawler fleet to the southeastern Atlantic. Some vessels moved from Georges Bank to ICNAF Subarea 4, others southward to the newly opened Havana fishing port, and others returned to home ports or to other fishing areas.

Eighty-eight different vessels were sighted during August: 25 factory stern trawlers, 22 medium side trawlers, 9 medium refrigerated side trawlers, 19 large refrigerated side trawlers, 3 processing refrigerated fish transports (*Skryplev* class), 1 refrigerated transport, 5 cargo and base ships, 1 tug, 2 tankers, and 1 research vessel.

The fleet operated in two general areas--40 miles south of Nantucket Island and in the Corsair Canyon area, 160 to 180 miles east of Cape Cod.

Ships were frequently scattered, indicating fishing was generally poor. Whiting (silver hake) appeared to be the predominant species taken. Twice during the month, Soviet vessels in the Corsair Canyon area were observed with moderate to substantial amounts of haddock on deck. Due to poor visibility, the area could not be covered during the month's last flight.

Polish and Romanian: Two Polish stern trawlers and one Romanian stern trawler were observed fishing with the Soviet fleet on Georges Bank. None of those vessels was seen with fish on deck.

East German: A large (3,000-gross-ton) factory stern trawler (ROS 302) was fishing near Georges Bank toward the end of August, the first time since 1962 that the East Germans extended operations to southernmost ICNAF subarea. Traditionally, they fish off Greenland and Labrador, in the North Sea and Baltic. This year, however, they also began to fish for pilchards off South-West Africa and to explore the South Atlantic.

OFF MID-ATLANTIC

U.S.S.R.: No Soviet fishing vessels sighted off the U.S. mid-Atlantic coast during August, except a few in transit headed north or south.

IN GULF OF MEXICO AND CARIBBEAN

U.S.S.R.: Medium freezer side trawlers (class *Maiak*) continued to fish in Gulf of Mexico, but not off U.S. coasts. They limited activity mainly to Campeche Banks off Yucatan Peninsula. Number of vessels fluctuated between 10 and 15. Although all are based at the Havana fishing port, they belong administratively to Kaliningrad Fisheries Administration. Early in 1966, that Administration formed a special Command, the Expeditionary Fleet Command, whose task is to start large-scale operations in the southwestern Atlantic. The *Maiak*-class, Havana-based Kaliningrad vessels will eventually be deployed to the South Atlantic.

In addition to medium side trawlers, about 12 large stern trawlers also fished on Campeche Banks. Some were deployed to the Gulf from the Northwest Atlantic; others arrived from Soviet ports. They belong also to the Kaliningrad Expeditionary Fleet Command, and some of them are reportedly fishing in the Gulf of Mexico only temporarily. Later they will be sent to the Southwest Atlantic.

Some of those vessels were sighted off Florida's coast on their way south. Others, no doubt, were returning to home ports from Cuban base. None was seen fishing.

Cuban: No vessels were sighted fishing off U.S. coasts. Some were reported fishing off southwest coast of Puerto Rico.

Mexican: In late July and early August, Mexican shrimp trawlers were sighted fishing off Texas.

OFF PACIFIC NORTHWEST (Washington and Oregon)

U.S.S.R.: The fleet, which numbered 100-110 fishing and support vessels during June, July, and first two weeks in August, had only about 80 vessels by end of August-early September (table).

Number of Soviet Trawlers and Support Vessels Sighted Off Pacific Northwest, July-Mid-September 1966				
Week ending:	ST	MT	Other	Total
July 2	8	76	21	105
July 9	7	80	23	110
July 16	9	78	24	111
July 23	9	64	21	104
July 30	11	76	18	105
Aug. 6	13	72	23	108
Aug. 13	10	77	19	106
Aug. 20	4	58	20	82
Aug. 27	2	56	19	77
Sept. 3	3	58	23	84
Sept. 10	6	56	19	81
Sept. 15	5	58	20	83

Note: "ST" - Large factory stern trawlers (2, 600-3, 200 gross tons).
 "MT" - Medium trawlers (250-600 gross tons).
 "Other" - Floating factories refrigerated carriers, transports, tugs, tankers, research vessels, and other support vessels.

From August 6 to September 15, number of large stern freezer trawlers was reduced from 13 to 5, and medium side trawlers from 72 to 58. This was significant decrease in Soviet fishing effort off Pacific Northwest; it was probably caused by the beginning of her-hering fishing in the Sea of Okhotsk and off Kamchatka's coasts, and saury fishing off Kuril Islands and Hokkaido.

Number of support vessels remained almost the same, indicating smaller fleet was making good catches.

The vessels fished in heavy concentrations, moving up and down the coast as fish were available.

Early in August, the fleet was fishing off Destruction Island. Then part of it moved south to Grays Harbor and Willapa Bay, and part north to Cape Flattery off northern Washington. At least 6 medium trawlers were fishing in pairs using 3 midwater trawls. Several vessels (at least 3 stern trawlers and 2 medium trawlers) were reported fishing about 20 miles off Cape Beale, off southwestern Vancouver Island, British Columbia.

By mid-August the fleet, still scattered from mouth of the Columbia River to Straits of Juan de Fuca, moved seaward; some vessels fished as far as 50 miles from U. S. shores.

By August 25, the fleet was again reported near the U. S. coasts, divided into two groups: one with 50 vessels was fishing for hake and orange rockfish off Newport, Oregon, concentrated in a 10-mile radius. The second with 32 vessels was fishing for hake off Willapa Harbor, Washington.

By the end of August, only about 30 vessels remained off Oregon's coast, the rest moved north off Willapa Harbor. The catches off Oregon were excellent and somewhat better than off Washington coast.

In the first week of August, Pacific hake catches appeared about average: the greatest was around 30,000 pounds; the smallest about 2,000 pounds.

In the second and third weeks, hake was still principal catch; however, the vessels off Destruction Island and to the north were reported catching more Pacific ocean perch and other rockfish than hake. Several vessels were seen with good catches of red snapper on deck.

By the end of August, when the fleet split into two groups (one off Oregon, the other off Washington), hake was again the principal species caught. Medium trawlers fishing off Oregon were seen taking as much as 25,000 pounds, and a "twin" trawl was observed with estimated catch of 150,000 pounds of hake. Some green-spotted or green-striped rockfish were also taken.

The estimated 1966 Soviet catch of Pacific hake off U. S. coasts amounted to over 60,000 metric tons (about 132 million pounds) by mid-August. The Soviet quota for 1966 is 100,000 metric tons.

The research vessel Adler tried to enter port of Vancouver, British Columbia (Canada), for repairs at end of July, but Canadian officials determined the repairs were not of emergency nature. Earlier, the Canadians did allow the Adler to resupply at Vancouver. By August 2, the vessel was again conducting research off Cape Elisabeth (Washington), then moved south to study fishery resources off California and northern Mexico. By mid-month, she returned north for short time before returning to Vladivostok; she arrived September 10. Her principal mission was investigation of fishery resources off U. S. and Mexican coasts for future exploitation.

The research vessel Ogon, which belongs to Pacific Scientific Institute for Fisheries and Oceanography (TINRO), was sighted in mid-August off Grays Harbor, and remained off Pacific Northwest well into mid-September. During August, Resource Management Agents of BCF did not see salmon on decks of Soviet vessels nor did they see salmon drying in the rigging. This does not exclude possibility that the Russians were making incidental catches of salmon, because surveillance flights took place only one day a week and each vessel could be observed only for a short time. However, a few U.S. fishermen did report seeing fishing vessels with salmon on deck. On August 20, Oregon Fish Commission officers, checking a fisherman's report, spotted a medium trawler with salmon on deck. Identified as the Kakhovka, she was sighted about 10 miles west and 5 miles north of mouth of Columbia River with load of salmon on deck.

BCF's Region I has formed an ad hoc committee of 25-30 representatives of Pacific Northwest fishing industry (fishermen's associations, unions, and fishing vessel owners' associations), fishery officials from State governments, and other citizens. The purpose of the committee, which will meet informally about once a month, is to disseminate information on foreign fishing off U. S. Pacific Northwest coasts and appraise all developments related to future foreign fishing near U. S. shores.

During routine surveillance flights by U. S. Coast Guard in August, practically no Soviet vessels were sighted closer than 12 miles off U. S. Pacific Northwest coasts. But, on August 23, the BCF research vessel John N. Cobb sighted 6 Soviet medium trawlers northwest of Columbia River's mouth close to U. S. shores. On August 24, ten medium trawlers fished the same general area, 8.7-10 miles off U. S. coast.

During a chartered flight by Oregon Fish Commission agents on August 20, 20-25 vessels were seen near Columbia River's mouth, the closest vessel 7.8 miles off U. S. coast.

OFF ALASKA

U.S.S.R.: During August, about 40 fishing and support vessels operated off Alaska's coast.

Fishing for Pacific ocean perch was conducted throughout the Gulf of Alaska and off

Aleutian Islands. The Gulf perch fleet was small: 4 large stern trawlers, 1 medium side trawler, and 2 refrigerated fish carriers; the Aleutian fleet had more than 20 vessels: among them, 10 large stern trawlers, 8 medium side trawlers, and 3 refrigerated carriers. Little information is available on perch fishing south of Pribilof Islands--only one medium side trawler was sighted, presumably exploring for ocean perch stocks.

According to Soviet sources, perch fishing in Gulf of Alaska was less satisfactory in August than in July. Bad weather was one reason, but principal reason was lack of exploratory and scouting vessels and assignment to fleet of young, inexperienced fishermen.

The shrimp fishing fleet, which had returned to U.S.S.R. in mid-1966, was again sighted in Shumagin Islands area in August. Three medium side freezer trawlers were sighted during surveillance patrol by BCF management agents aboard U. S. Coast Guard cutter. No estimates of catches are available.

Whaling operations in northern Pacific continued on large scale but only one large factoryship was sighted in western Aleutians about mid-August.

Japanese: A total of 206 Japanese vessels were fishing off Alaska coast in August.

Pacific ocean perch fishing in Gulf of Alaska was in full swing in early August, when 5 trawlers ended salmon buying in Cook Inlet, and 2 trawlers ended shrimp operations in Shumagin Islands area and resumed perch fishing. One vessel was added to Gulf fleet in late August. At month's end, 12 trawlers and 3 reefers were on Albatross Bank and one trawler was fishing on outer Portlock Bank.

In Aleutian Islands area, along the central and western Aleutians, two factoryships and 11 trawlers fished for perch.

The two king crab fleets remained on Bristol Bay "flats" throughout August, about 150 miles northwest of Port Moller.

Fish meal and oil operations were conducted by 2 factoryships accompanied by 58 trawlers about 200 miles south of Nunivak Island, and by 2 factoryships accompanied by 40 trawlers northwest of Pribilof Islands.

One factoryship and her 13 trawlers remained on shrimp grounds near Pribilof Islands throughout August.

The three whaling fleets operated throughout Aleutian Islands. One fleet departed for Japan at month's end.

Long-line operations for sablefish were conducted in late August by 1 vessel in western Gulf, 2 vessels along western Aleutians, and 1 vessel along 100-fathom curve north of Unimak Pass.

Korean: The research vessel Baek Kyung Ho of the National Pusan Fisheries College was sighted south of Amukta Pass in central Aleutians on August 13. A BCF agent boarded vessel. Personnel reported being in Aleutians area for about one month and planned to sail for Korea on September 20. The vessel fished for salmon using gill nets at preselected stations. Samples of 50 salmon per day were to be taken at each station, but catches were said to be poor--averaging 15 a day, mostly small red salmon. The Koreans said they had trawled but had taken no salmon. On August 25, the vessel was in northern Bering Sea, north of St. Matthew Island.



JUNK CARS MAKE EFFECTIVE ARTIFICIAL FISHING REEFS

Abandoned cars and other refuse that clutter up our cities and countryside have proven to be good material for building fishing reefs in the sea, according to a report published by the American Littoral Society.

The fish are attracted to the artificial reefs because some feed off mussels and other organisms which attach themselves to the reef materials. Other fish find protection in the holes and crevices, and still others simply like a place to call "home". A properly constructed reef in time becomes a veritable "city of fish"--a collection point for year round food fish as well as a seasonal haunt of migratory game fish.

The growing acres of junk cars now plaguing cities may prove a blessing in disguise to fishermen. Fishery biologists have proved with test reefs that a barren part of the sea can be transformed into a favored haunt for fish. Between 1958 and 1960, a small car-body reef was built at a depth of 50 feet in Paradise Cove near Malibu (California). Fish were attracted only a few hours after it was down. Over a 30-month study period, 49 different species of fish were counted on the reef by SCUBA diving biologists. One of the best experimental reefs was built in Maunaloa Bay, Hawaii, and tested from 1961 to 1963. Junk cars were spread over a virtually barren bottom. Fish life boomed and within 7 months 10 tons of fish came to live on the 13-acre reef made from 443 cars.

The artificial reef tests results showed that the cars stayed in place at the bottom and were not scattered by storms or currents. Junk car reefs, however, would have to be replenished every few years since bodies rust away in 3 to 5 years. Biologists have also tested some more permanent materials (quarry rock and concrete structures) for reef building. However, these are more costly than junk car reefs and do not help in cleaning up our countryside.

All reefs must have the approval of the District Army Corps of Engineers, the Navy, and in most states, the Department of Conservation. Artificial reefs must also be properly buoyed so that they can be located easily and the buoys maintained. Bottom type, wave action, depth, height and placement of the man-made reef affect the endurance and productivity of the project. Reef-building obviously is not a task for the amateur.

The report, "Artificial Reefs - A Review", is available from the American Littoral Society, Sandy Hook Marine Laboratory, Highlands, New Jersey 07732, for \$1.00 a copy.

PUBLICATIONS

FISH AND WILDLIFE SERVICE

These publications are available free from the Office of Information, U. S. Fish and Wildlife Service, Washington, D. C. 20402. Publications are designated:

CFS --Current fishery statistics of the United States.

FL --Fishery leaflets.

SEP.--Separates (reprints) from Commercial Fisheries Review.

SSR.--Fish.--Special Scientific Reports--Fisheries (limited distribution).

Number	Title
CFS-4127--	Michigan, Ohio, & Wisconsin Landings, March 1966, 4 pp.
CFS-4143--	South Carolina Landings, April 1966, 2 pp.
CFS-4155--	Maryland Landings, April 1966, 4 pp.
CFS-4156--	Texas Landings, 1965 Annual Summary, 8 pp.
CFS-4158--	Massachusetts Landings, 1965 Annual Summary, 13 pp.
CFS-4165--	New York Landings, March 1966, 4 pp.
CFS-4167--	New York Landings, April 1966, 4 pp.
CFS-4170--	Hawaii Fisheries, 1965 Annual Summary, 4 pp.
CFS-4173--	New Jersey Landings, May 1966, 3 pp.
CFS-4174--	Shrimp Landings, January 1966, 5 pp.
CFS-4176--	Georgia Landings, May 1966, 3 pp.
CFS-4177--	Mississippi Landings, April 1966, 3 pp.
CFS-4178--	Mississippi Landings, May 1966, 3 pp.
CFS-4180--	Maryland Landings, May 1966, 4 pp.
CFS-4181--	Virginia Landings, May 1966, 4 pp.
CFS-4182--	Fish Meal and Oil, May 1966, 2 pp.
CFS-4183--	North Carolina Landings, June 1966, 4 pp.
CFS-4184--	Florida Landings, May 1966, 8 pp.
CFS-4186--	Louisiana Landings, May 1966, 3 pp.
CFS-4187--	Massachusetts Landings, January 1966, 5 pp.
CFS-4190--	California Landings, April 1966, 4 pp.

CFS-4196--Florida Landings, June 1966, 8 pp.
CFS-4197--Maine Landings, May 1966, 4 pp.
CFS-4199--Maryland Landings, June 1966, 4 pp.

Sep. No. 771--An Evaluation of the Air Bubble Curtain as a Barrier to Alewives, by George A. Kupfer and William G. Gordon.

FL-582--The Bait Shrimp Industry of the Gulf of Mexico, by Anthony Inglis and Edward Chin, 13 pp., illus., May 1966. (Also Contribution No. 211, BCF Biological Laboratory, Galveston, Tex.) Describes fishing gear used by shrimp bait fishermen, the methods of operation, and the marketing practices in Texas and Florida.

SSR--Fish. No. 526--Synopsis on the Biology of the Jack Mackerel (*Trachurus symmetricus*), by John S. MacGregor, 19 pp. illus., April 1966.

SSR--Fish. No. 527--Age and Size Composition of the Menhaden Catch Along the Atlantic Coast of the United States, 1962. With Brief Review of the Commercial Fishery, by William R. Nicholson and Joseph R. Higham, Jr., 28 pp., illus., February 1966.

Annual Report of the Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass., for the Fiscal Year Ending June 30, 1964, by Joseph W. Slavin, Circular 241, 34 pp., illus., May 1966. During 1964 the laboratory emphasized methods of improving the quality of fish and fishery products. Report discusses research on freeze denaturation of proteins, preservation and processing, standards and specifications, and radiation pasteurization; also, the laboratory's marine products development irradiator program and aims, and inspection and certification of fishery products. Included are lists of publications by laboratory personnel and papers presented at meetings.

Report of the Bureau of Commercial Fisheries Biological Station, St. Petersburg Beach, Florida, Fiscal Year 1965, by James E. Sykes, Circular 242, 34 pp., illus., April 1966. Discusses estuarine and red-tide investigations, and some results.

Fishery Bulletin, vol. 65, no. 2, January 1966, pp. 299-525, illus., printed. Some articles: "Annual marks on shell and ligament of sea scallop Placopecten magellanicus," by Arthur S. Merrill, Julius A. Posgay, and Fred E. Nichy; "Dynamics of a penaeid shrimp population and management implications," by Joseph H. Kutkuhn; "Study of loss and delay of salmon passing Rock Island Dam, Columbia River, 1954-56," by Robert R. French and Roy L. Wahle; "Occurrence in Tampa Bay, Florida, of immature species dominant in Gulf of Mexico commercial fisheries," by James E. Sykes and John H. Finucane; "Gill net mesh selection curves for Pacific salmon on the high seas," by Alvin E. Peterson; "Life history of the gizzard shad, Dorosoma cepedianum (Le Sueur), in western Lake Erie," by Anthony Bodola; "Migrations and geographic distribution of pink shrimp Penaeus duorarum, of the Tortugas and Sanibel Grounds, Florida," by T. J. Costello and Donald M. Allen; "Time of migration and age group structure of sockeye salmon (Oncorhynchus nerka) spawning populations in the Naknek River system, Alaska," by Richard R. Straty; "Skipjack tuna spawning in the Marquesas Islands and Tuamotu Archipelago," by Howard O. Yoshida; "Food of young-of-the-year wall-eyes in Lake Erie," by David R. Wolfert; and "Effect of the spawning bed environment on reproduction of pink and chum salmon," by William J. McNeil.

Fishery Bulletin, vol. 65, no. 3, 1966, pp. 527-686, illus., printed. Some articles: "Life history of the spiny dogfish," by Albert C. Jensen; "Pygmy whitefish Prosopium coulteri in the Naknek River system," by William R. Heard and Wilbur L. Hartman; "A review of western Atlantic cat sharks, Scyliorhinidae, with descriptions of a new genus and five new species," by Stewart Springer; "Survey of pelagic fishes of the California current area," by Frederick H. Berry and Herbert C. Perkins; and "Rapid method for determining water content in oyster tissue," by Thomas C. Carver, Jr.

The following publications are available only from the specific office mentioned:

California Fishery Market News Monthly Summary, Part I—Fishery Products Production and Market Data, July 1966, 15 pp. (Market News Service, U. S. Fish and

Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.) California cannery receipts of tuna and tunalike fish and other species used for canning; pack of canned tuna, tunalike fish, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California and Arizona imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; prices for fish meal, oil, and solubles; for the month indicated.

California Fishery Market News Monthly Summary, Part II—Fishing Information, July 1966, 14 pp. illus. (U. S. Bureau of Commercial Fisheries, Tuna Resources Laboratory, P. O. Box 271, La Jolla, Calif. 92038). Contains sea-surface temperatures, fishing and research information for July of interest to the West Coast tuna-fishing industry and marine scientists.

California Fishery Products and Byproducts Brokers, Importers, and Exporters, 1966, SP List 1 (Revised), 15 pp., August 1966. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.)

Available from the Branch of Reports, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington, D. C. 20240:

Oceanographic Observations, 1963, East Coast of the United States, by Joseph Chase, Data Report 10, 3 microfiche cards, illus., Mar. 1966, distribution limited.

Oceanographic Observations South of Adak Island, Summer 1963, by Craig Van Dyke, Data Report 12, 1 microfiche card, illus., May 1966, distribution limited.

Proximate Composition of Lake Michigan Alewife (Alosa pseudoharengus), by Donald R. Travis, FIR Reprint 33, 3 pp., printed. (Reprinted from Fishery Industrial Research, vol. 3, no. 2, pp. 1-4.) Branch of Reports, U. S. Bureau of Commercial Fisheries, 2725 Montlake Blvd., Seattle, Wash. 98102.

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, July 1966, 9 pp. (Market News Service, U. S. Fish and Wildlife Service, 706 New

Federal Office Bldg., 909 First Ave., Seattle, Wash. 98104.) Includes July information on landings by the halibut fleet reported by the Seattle Halibut Exchange; salmon landings reported by primary receivers; landings of halibut reported by International Pacific Halibut Commission; landings and otter-trawl receipts reported by Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and nonscheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington customs district.

Shellfish Situation and Outlook, CEA-S1, 47 pp., June 1966. (U. S. Bureau of Commercial Fisheries, Branch of Current Economic Analysis, 1815 N. Ft. Myer Drive, Arlington, Va. 22209.) First issue of new quarterly directed mainly at assisting fishery management in making short-run and intermediate production, distribution, and pricing decisions. Available pertinent shellfish facts assembled and analyzed to give picture of probable market conditions and price movements in the future.

The following service publication is for sale and is available only from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402:

Pollution-Caused Fish Kills in 1965, Sixth Annual Report, WP-12, 32 pp., illus., printed, 1966, 25 cents. Data on pollution-caused fish kills by State, source of pollution, type of water and water body, severity of damage, and related subjects.

MISCELLANEOUS

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them. Correspondence regarding publications that follow should be addressed to the respective organization or publisher mentioned. Data on prices, if readily available, are shown.

AGAR AGAR:

"Mode of action of an inhibitor from agar on growth and hemagglutination of group A arboviruses," by Julio I. Colón and others, article, Journal of Bacteriology, vol. 90, July 1965, pp. 172-179, printed. Williams & Wilkins Co., 428 East Preston Street, Baltimore, Md. 21202.

ALGAE:

"Utilization of algae as a protein source for humans," by Richard Dam, et al., article, Journal of Nutrition, vol. 86, Aug. 1965, pp. 376-382, printed. Wistar Institute of Anatomy and Biology, 36th Street at Spruce, Philadelphia, Pa. 19104.

ANTIBIOTICS:

Antimycin--A New Fishery Tool, by Robert E. Lennon, 2 pp., illus., printed. (Reprinted from Wisconsin Conservation Bulletin, March-April 1966.) Wisconsin Conservation Department, Box 450, Madison, Wis. 53701.

AUSTRALIA:

Fisheries Australia, Statistical bulletin No-11-1964-65, 52 pp., illus., processed. Commonwealth Bureau of Census and Statistics, Canberra, Australia. Contains statistics on Australia's marine and fresh-water fisheries, including boats, equipment and persons engaged; production, processing and consumption; and foreign trade.

CANADA:

35th Annual Report 1964, 102 pp., illus., printed, 1966. Department of Fisheries, Ottawa, Canada. (Sold by Queen's Printer and Controller of Stationery, Ottawa, Canada.) Contains such items as inspection service; economics service; industrial development service; fishermen's indemnity plan; Fisheries Prices Support Board; and the fishing industry. Also, statistical tables showing the landings and landed values of fish and shellfish by areas and species, and by areas and provinces; export by types of products; and others.

"The South Bay Fisheries Research Station," by F. P. Maher, article, Ontario Fish and Wildlife Review, vol. 5, no. 1, 1966, pp. 15-20, illus., printed. Department of Lands and Forests, Parliament Buildings, Toronto 5, Ontario, Canada.

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

CEYLON:

Administration Report of the Director of Fisheries for 1963-64, by S. S. H. Silva, Part IV--Education, Science, and Art (L), 105 pp., printed in Sinhalese and English, September 1965. Government Publications Bureau, P.O. Box 500, Secretariat, Colombo.

COD:

"Noen forsok med 'dobbeltfrysing av torsk'" (Some experiments with freezing and re-freezing of codfish), by G. Lorentzen, article, Kulde, vol. 19, no. 4, August 1965, pp. 53-58, illus., printed in Norwegian.

CRAB:

"King crab gets royal treatment from quality-conscious packers," article, Pacific Fisherman, vol. 63, June 1965, pp. 16-22, printed. Pacific Fisherman, Editorial Office, 71 Columbia St., Seattle, Wash. 98104.

DENMARK:

Bulletin Statistique des Pêches Maritimes (Statistical Bulletin for Marine Fisheries), vol. XLVIII (1963), 67 pp., printed in English, January 1966. Conseil Permanent International pour l'Exploration de la Mer, Charlottenlund Slot, Denmark.

EELS:

Sand Eels (AMMODYTIDAE) in the South-Western North Sea; Their Biology and Fishery, by C. T. Macer, Fishery Investigations, series II, vol. XXIV, no. 6, 58 pp., illus., printed, 1966, 19s. (US\$2.66). Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England. (Sold by Her Majesty's Stationery Office, 49 High Holborn, London, W.C.1, England.)

FATTY ACIDS:

"The triglycerides of sablefish (Anaplopoma fimbria). II--Fatty acid distribution in triglyceride fractions as determined with pancreatic lipase," by Ami Dolev and H. S. Olcott, article, Journal of the American Oil Chemists Society, vol. 42, Dec. 1965, pp. 1046-1051, printed. American Chemical Society, 1155 Sixteenth Street NW., Washington, D.C. 20036.

FISH MEAL:

"Fish meal studies. 2--Effects of levels and sources on 'fish flavor' in broiler

meat," by Jack L. Fry, et al, article, Poultry Science, vol. 44, July 1965, pp. 1016-1019, printed. Poultry Science, Texas A & M College System, College Station, Tex. 77843.

FISH MUSCLE:

"Fatty acid uptake and esterification by fish muscle," by M. Hamosh, R. Atia, and B. Shapiro, article, Journal of Food Science, vol. 31, Mar.-Apr. 1966, pp. 146-150, printed. The Garrard Press, 510 North Hickory St., Champaign, Ill. 61820.

FISH PROTEIN CONCENTRATE:

"Fish flour: FDA approval likely on improved product," by Jane Ayres, article, Science, vol. 152, May 6, 1966, pp. 738-739, American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

"Supplementation of bread with fish flour and amino acids--A comparison of evaluation methods," by G. R. Jansen, C. F. Hutchison, and M. E. Zanetti, article, Food Technology, vol. 20, Mar. 1966, pp. 91-94, printed. Institute of Food Technologists, Special Services Office, 510 North Hickory St., Champaign, Ill. 60611.

FISH PUMP:

"Fish pump's gentle touch is kind to profits," article, Fishing Gazette, vol. 82, Sept. 1965, pp. 17, 23, printed. Fishing Gazette Publishing Corp., 461 Eighth Ave., New York, N. Y. 10001.

FRANCE:

Cahiers O.R.S.T.O.M.-Océanographie, vol. III, no. 1, 1965, 105 pp., illus., printed in French, a single issue 20 francs (US\$4.00) plus postage. Office de la Recherche Scientifique et Technique Outre-Mer, 24, rue Bayard, Paris 8^o, France. (Sold by Service Central de Documentation, 80, route d'Aulnay, Bondy, Seine.) Includes articles on: "Note d'information sur les prospections de fonds chalutables effectuées par le centre d'oceanographie et des peches (ORSTOM) de Pointe-Noire dans l'est du Golfe de Guinee" (Information note on explorations of trawlable bottoms by Le Centre d'Océanographie et des Pêches (ORSTOM) de Pointe-Noire in the eastern Gulf of Guinea), pp. 71-72; "Etude de

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

quelques caracteres de *Sardinella eba* (C et V) de Cote D'Ivoire" (Some characteristics of *Sardinella eba* (C et V) of the Ivory Coast), by E. Marchal, pp. 87-94; "Note sur deux caracteres de *Sardinella aurita* (C et V) de Cote D'Ivoire" (Note on two characteristics of *Sardinella aurita* (C et V) of the Ivory Coast), by E. Marchal, pp. 95-99.

Essais d'Ostreiculture dans les Marais Vendéens (Oyster Culture Tests in the Vendéens Marshes), by Marie-José Corbeil, *Science et Pêche*, no. 148, May 1966, 15 pp., illus., printed in French. L'Institut Scientifique et Technique des Pêches Maritimes, 59 Avenue Raymond-Poincaré, Paris 16^e, France.

FREEZING

"Experimental study of freezing fish by liquid nitrogen," by A. Kaneko, article, *Refrigeration*, vol. 40, no. 456, October 1965 pp. 28-30, illus., printed. Nickerson & Collins Co., 433 North Waller Ave., Chicago, Ill., 60644.

FREEZING AT SEA:

"Erfaringer med frysing ombord" (Experiences with freezing at sea), by P. Hysing-Dahl, article, *Kulde*, vol. 19, no. 4, August 1965, pp. 49-52, printed in Norwegian.

FRESH-WATER FISHERIES:

"The productivity of lakes and rivers," by Vittorio Tonolli and Julian Rzóška, article, *New Scientist*, vol. 30, no. 491, April 14, 1966, pp. 119-121, illus., printed. Cromwell House, Fulwood Place, High Holborn, London WC1, England. How much fish can men expect to harvest from their inland waters? Author believes the answer to this question is to be sought in many places and many climates, on the basis of thorough measurements of aquatic ecological systems under the International Biological Programme.

GENERAL:

McClane's Standard Fishing Encyclopedia and International Angling Guide, edited by Albert J. McClane, 1,088 pp., illus., printed, \$23.95. Holt, Rinehart, and Winston, Inc., 383 Madison Ave., New York N.Y., 10017. Contributions from 141 scientists and angling experts. Detailed information on world's fishing areas, chapters on fly fish-

ing, spinning, trolling, and surf casting. Instructions on rod-building; mounting and preserving specimens in the field; scuba diving; smoking, freezing, storing, and cooking fish; fly-tying; choosing best fishing craft for any type water; understanding aquatic and marine biology; first aid and protection against dangerous marine organisms; raising bait fish. Water pollution and thermal stratification of lakes. Each fish is cross-referenced with common, and local names, anatomy, size, color, spawning habits, food, growth, age, young, etc. Lengthy chapter on preparation and cooking fish, with recipes covering methods, sauces, and other pertinent details.

HERRING:

Herring Stock Record Data, 1964, Statistical News Letters, no. 27, 77 pp., illus., printed, May 1966. International Council for the Exploration of the Sea, Charlottenlund Slot, Denmark.

INDIA:

"The fishing industry in India (targets for production)," article, *Seafood Trade Journal*, vol. 1, no. 7, July 1966, pp. 21-23, printed. The Seafood Cannery and Freezers' Association of India, Cochin, India.

IOWA:

Quarterly Biology Reports, vol. XVII, no. 1, Jan., Feb., Mar. 1966, 48 pp., illus. Biology Section, Fish and Game Division, State Conservation Commission, East 7th and Court Sts., Des Moines, Iowa 50309. Section on fisheries contains: "West Okoboji Lake walleye study--1964-65," by Terry Jennings; "A description of the Wapsipinicon River drainage with reference to the fishes of the proposed Central City reservoir," by Robert Schacht; "Missouri River Ox-Bow Lake fishery--Part 2: Walleye and sauger," by Bill Welker; and "Evaluation of the utilization of 1½-inch and 3-inch bar measure buffalo nets on Des Moines River," by Gary L. Ackerman.

IRRADIATION PRESERVATION:

"Food irradiation approaches commercialization," article, *Processing and Freezing*, vol. 38, July 1965, pp. 8-9, printed. Ginn-Schrock Publishing Company, 612 N. Michigan Ave., Chicago, Ill. 60611.

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JAPAN:

Bulletin of the Japanese Society of the Scientific Fisheries, vol. 31, no. 12, December 1965, pp. 955-1080, illus., printed in Japanese and English. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan. Includes articles on: "The reproduction situation of Pacific salmon (*Oncorhynchus* sp.) in Alaska - I. Pink salmon (*O. gorbuscha*)," by Kisaburo Taguchi, pp. 957-963; "The reproduction situation of Pacific salmon (*Oncorhynchus* sp.) in Alaska. II. Chum salmon (*O. keta*)," by Kisaburo Taguchi, pp. 964-970; "Bathymetric change of daily hauls per boat in relation to daily catch by the Danish seiners of a fish-meal fleet fishing in the Bering Sea," by Shiro Minami, pp. 971-976; "The discrimination of races of 52 and 63 aged sockeye salmon and their distributions in the northern Pacific," by Hiroshi Hirose and Ryuhei Sato, pp. 1,006-1,018; "Distribution pattern of groundfishes hooked along a row of setline in the shallower part of the Continental Slope in the Bering Sea - IV. Distribution on a very easy slope," by Hiroshi Maeda, pp. 1,019-1,025; "Studies on the effects of marine products on cholesterol metabolism in rats - V. The effects of edible seaweeds (supplement)," by Takashi Kaneda, Pentula V. Kamasastri and Setsuko Tokuda, pp. 1,026-1,029; "Studies on the biological formation of formaldehyde and dimethylamine in fish and shellfish - VII. Effect of methylene blue on the enzymatic formation of formaldehyde and dimethylamine from trimethylamine oxide," by Kinjiro Yamada and Keishi Amano, pp. 1,030-1,037; "On the behavior of fish to fishing nets (review)," by Chihiro Miyazaki, pp. 1,049-1,080.

KENYA:

Report on Kenya Fisheries 1964, 30 pp., illus., printed, 1966, 3s. (42 U.S. cents). Republic of Kenya, Nairobi, Kenya. Reports on the inland fisheries of Western and Nyanza provinces; Lake Victoria fishery; fisheries of Lakes Naivasha and Baringo; trout hatchery and fisheries; fish culture farm, Sagana station; Turkana fishery at Ferguson's Gulf, Lake Rudolf; inland fisheries of Coast Province; sea fisheries; plus fishery statistical tables on production, imports and exports, catch analysis, etc.

MEDITERRANEAN:

Studies and Reviews, processed. General Fisheries Council for the Mediterranean, Secretariat, Food and Agriculture Organization of the United Nations, Rome, Italy.

No. 27--Labour-Saving Methods on Board Mediterranean Trawlers, 32 pp., illus., November 1965.

No. 28--Preliminary Report on Fish Distribution and Marketing in Sicily, 28 pp., illus., November 1965.

No. 29--Sanitary Regulations for Molluscs, 19 pp., December 1965.

No. 30--The Raising of Brown Trout and Rainbow Trout in Water at High Temperatures, 54 pp., illus., December 1965.

MEXICO:

Educacion Pesquera en Noruega (Fishery Education in Norway), Trabajos de Divulgacion, vol. X, no. 92, 15 pp., processed in Spanish, Oct. 1964. Instituto Nacional de Investigaciones Biologico-Pesqueras, Direccion General de Pesca e Industrias Conexas, Secretaria de Industria y Comercio, Mexico D.F., Mexico.

MICRONESIA:

Fishes of the Marshall and Marianas Islands, by Leonard P. Schultz, Earl S. Herald, Ernest A. Lachner, Arthur D. Weland, and Loren P. Woods, U. S. National Museum Bulletin 202, vol. 1, 717 pp., illus., printed, 1953, \$2.75. Smithsonian Institution, Washington, D. C. (Sold by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

OCEANOGRAPHY:

Marine Sciences Instrumentation, by William C. Knopf and Herbert A. Cook, vol. 3, 295 pp., illus., printed, \$12.50. Plenum Press. Proceedings of the Third National Marine Sciences Symposium (Miami, Fla. 1965); papers range from evaluation of the jet net and aspects of expandable instrumentation to discussion of sensors for the observation of wave height and wind direction.

"Oceanography: PSAC (President's Science Advisory Committee) panel calls for setting

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up new agency," article, *Science*, vol. 153, no. 3734, July 22, 1966, pp. 391-393, printed, single copy 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

OYSTERS:

Time and Intensity of Setting of the Oyster, CRASSOSTREA VIRGINICA, in Long Island Sound, by Victor L. Loosanoff, 17 pp., illus., printed. (Reprinted from *Biological Bulletin*, vol. 130, no. 2, April 1966, pp. 211-227.) The Marine Biological Laboratory, Woods Hole, Mass.

POLAND:

Technika i Gospodarka Morska (Marine Technology and Economics), vol. 16, no. 4, 120-162 pp., illus., with *Bulletin* (Biuletyn Techniczny), no. 4(20), pp. 79-84, processed in Polish with Polish, Russian, and English contents, April 1966. P. P. Wydawnictwo Morskie, Al Waszyngtona 34, Gdynia, Poland. Contains, among others, articles on: "U.S. deep-sea fisheries in North-Atlantic waters," "Repair workshops in fishing enterprises," by K. Jaworski; "Operational merits of vessels of B-512 (m/s, Kolejarz) type," by J. Milobedzki; and "Safety of life at sea conference," by W. Kon.

SALMON:

Effects of Log Driving on the Salmon and Trout Populations in the Stellako River, by Technical Staffs of the Canada Department of Fisheries and the International Pacific Salmon Fisheries Commission in Collaboration with the Fish and Wildlife Branch, B. C. Dept. of Recreation and Conservation, International Pacific Salmon Fisheries Commission Progress Report No. 14, 91 pp., illus., processed, 1966. International Pacific Salmon Fisheries Commission, P. O. Box 1120, New Westminster, B. C., Canada.

SEA WATER:

"Lipids in sea water," by Lela M. Jeffery, article, *Journal of the American Oil Chemists' Society*, vol. 43, Apr. 1966, pp. 211-214, printed. The American Oil Chemists' Society, 33 East Wacker Drive, Chicago, Ill. 60601.

SPAIN:

"La exportacion Gallega de conservas en 1965" (Galicia's exports of canned fishery products in 1965), by Mareiro, pp. 123-124; "Las industrias de la pesca en Galicia durante el ano 1965" (The fishing industry in Galicia during 1965), pp. 129-130; articles, *Industria Conservera*, vol. XXXII, no. 323, May 1966, printed in Spanish, single copy 25 ptas. (about US\$0.40). Union de Fabricantes de Conservas de Galicia, Marqués de Valladares, 41, Vigo, Spain.

SWEDEN:

"Förändringar hos fiskmuskelpoteiner vid nedfrysningen och deras inhibering med hjälp av fostfater" (Changes in fish proteins in freezing and their inhibition with phosphates), by T. Kuusi, O. E. Nikkila, and R. Kytokangas, article, *Kulde*, vol. 19, no. 4, August 1965, pp. 128-130, illus., printed in Swedish.

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"Studies on the retention of colour of frozen tuna. II. Effect of storage temperature on preventing discoloration of tuna meat during freezing storage"; III. "The discoloration of tuna meat during the storage at temperature near the freezing point," by M. Bito, article, *Bulletin of the Japanese Society of Scientific Fisheries*, vol. 31, no. 7, July 1965, pp. 534-539 and pp. 540-545, illus., printed in Japanese. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

TURKEY:

Balik ve Balikçilik, vol. XIV, no. 5, May 1966, 31 pp., illus printed in Turkish. Et ve Balik Kurumu G.M., Balikçilik, Müdürlüğü, Besiktas, Istanbul, Turkey. Includes articles on: "Deniz yosunlarından kırmızı algler (Kırmızı su Yosunları) (Kisim V)" (The red algae--Part V), by Hikmet Akgunes, pp. 9-13; "Soğuk ve balikçilik I. Dünya denizlerinde hızlı dondurma tatbikati (Kisim II)" (Cold storage and fishing, application of quick freezing on board (Part II), by Mak. Y. Müh. Erol Ertas, EBK Tesisat Müdürlüğü.

U.S.S.R.:

"La piscicultura en Rusia" (Fish culture in Russia), article, *Industrias Pesqueras*, vol. 39, no. 919, August 1965, illus., printed in

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Spanish, single copy 50 ptas. (about US\$0.85). Industrias Pesqueras, Apartado 35, Policarpo Sanz, 21-2, Vigo, Spain.

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The Cod and Cod Fishery at Faroe, by B. W. Jones, article, Fishery Investigations, series II, vol. XXIV, no. 5, 36 pp., illus., printed, single copy 11s. 5d. (US\$2.20), Ministry of Agriculture Fisheries and Food, London, England. (For sale by British Information Services, 845 3rd Avenue, New York, N. Y. 10022.)

"Spotlight on Torry," article, Modern Refrigeration, vol. 68, no. 808, July 1965, pp. 659-660, illus., printed. Refrigeration Press Ltd., Maclaren House, 131 Great Suffolk Street, London, S.E.1, England. A description of the work of the Torry Research Station.

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"Steel crab boat features outstanding sea-kindliness," article, Fish Boat, vol. 11, Mar. 1966, pp. 26-27, printed. H. L. Peace Publications, 624 Gravier St., New Orleans, La. 70150.

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Catalog of Living Whales, by Philip Hershkovitz, Bulletin 246, 267 pp., printed, 1966, \$1.00. Smithsonian Institution, U. S. Na-

tional Museum, Washington, D. C. 20560. (Sold by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

YUGOSLAVIA:

Morsko Ribarstvo, vol. 17, no. 10, September-October 1965, printed in Serbo-croatian; Morsko Ribarstvo, V. Bogota 3, P.O.B. 185, Rijeka, Yugoslavia. Contains these articles: "Simpozij: Riblje meso u našoj prehrani" (Symposium: The role of fish in our nutrition), pp. 162-164; "Bioekologija tunja: migracije tunja" (Bio-ecology of tunas: tuna migrations), by D. Morović, pp. 165-171; "Organoleptička svojstva kao faktor ocjene kvalitete i higijenske ispravnosti tune" (Organoleptic characteristics as a factor in the evaluation of the quality and hygienics of tuna products), by R. Celebrini, pp. 172-173; "Ubrzani porast potrošnje ribe u Jugoslaviji--kategorički imperativ ekonomskog razvoja" (Rapid increase of fishery consumption in Yugoslavia is imperative for economic development), by B. Jurić, pp. 174-176; "Oslić; Merlucius merlucius L." (European hake; Merlucius merlucius L.), by J. Basiolo, pp. 182-184; "Naši ribarski brodovi su brodovi Jugoslavenske trgovačke mornarice posebne namjene" (Our fishing vessels are vessels of the Yugoslav Merchant Marine used for special purposes), by L. Kos, pp. 190-191.



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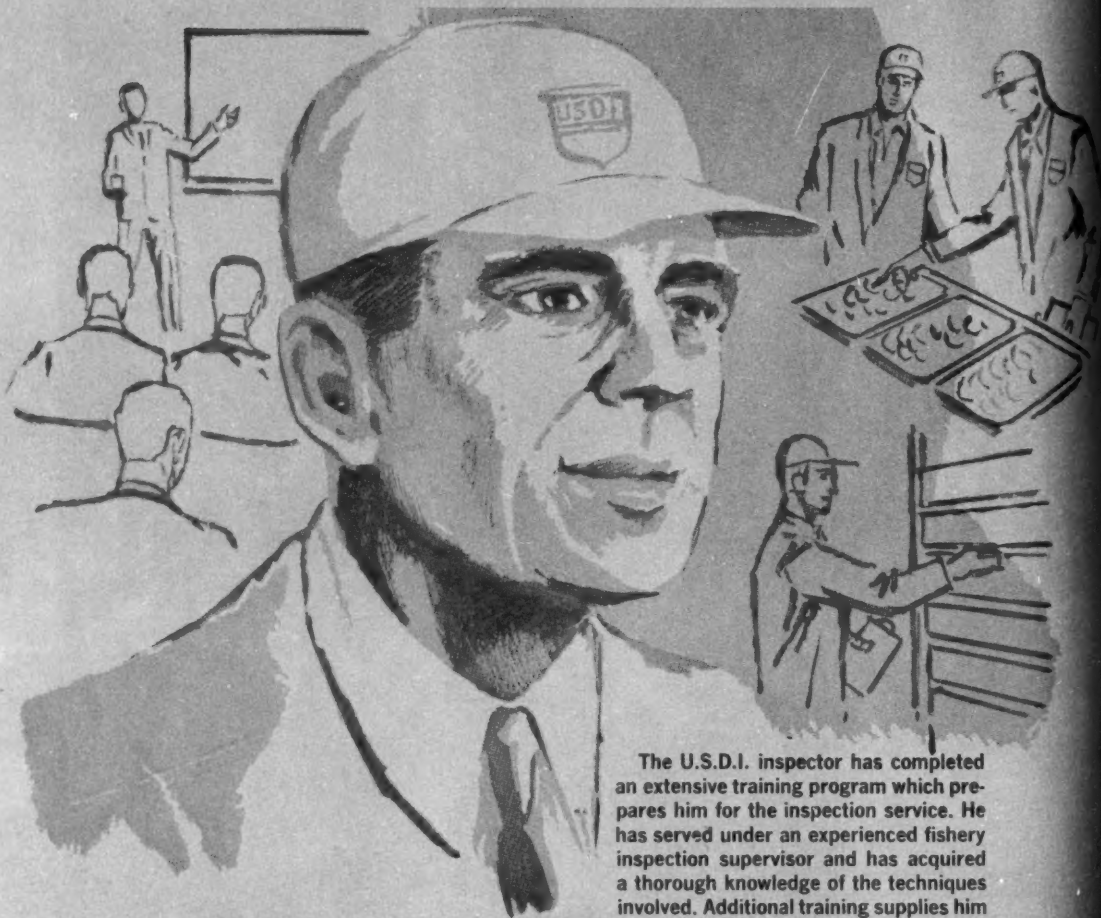
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